Environmental Assessment - Upgrade Corridor Area Fire Protection

SUMMARY

The National Park Service is proposing to upgrade the existing water distribution system connected to the Transcanyon pipeline to deliver the volume and pressure needed to supply fire sprinkler and standpipe hydrant systems at four sites along the corridor area trails: Indian Garden, Phantom Ranch, Cottonwood Camp and Roaring Spring. The proposal would also install detection and alarm systems, automated sprinkler systems, and an enhanced and expanded standpipe hydrant system with associated equipment to protect several of the most vulnerable structures. The standpipe system upgrade would install new hydrants capable of the required regulatory flow at key locations and includes the installation of hose boxes, fire hose, nozzles, and other required fire protection equipment.

This environmental assessment evaluates potential impacts from two alternatives: the preferred (described above) and the no- action alternative. Under the no- action alternative, operation of the four sites would continue under the present management operation. Historic and non- historic structures would continue to be inadequately protected from fire.

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INTRODUCTION

This document analyzes the expected effects to the human environment from the proposed project to upgrade the Corridor Area Fire Protection System. The human environment is defined as the natural and physical environment and the relationship of people with that environment. The Corridor Area Fire Protection System is on lands administered by the South Rim district of Grand Canyon National Park, in Coconino County, Arizona. The proposal includes four areas, Roaring Springs, Cottonwood Camp, Phantom Ranch, and Indian Garden. All efforts are designed to improve the functionality of the fire protection system to protect historic structures, employees, and visitors. Ground disturbing activities are limited to trenching for new and replacement water lines to the structures from the Transcanyon Pipeline, and a sand filter bypass at Indian Garden. For further reference, see the project vicinity maps on pages 5 and 6.

PURPOSE AND NEED FOR ACTION

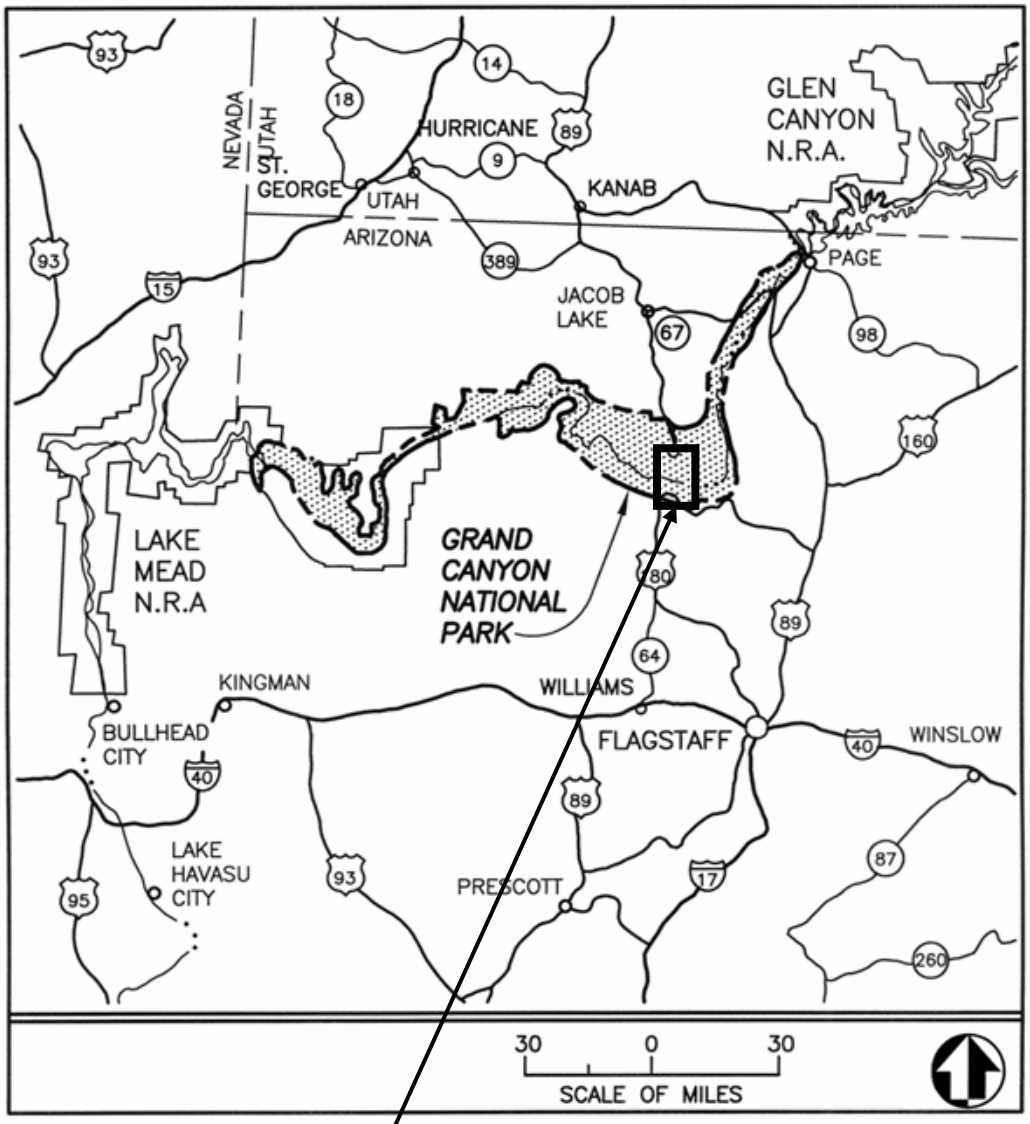
The purpose of the proposal is to upgrade the existing water distribution system connected to the Transcanyon pipeline to deliver the volume and pressure needed to supply fire sprinkler and standpipe hydrant systems. It would also install detection and alarm systems, automated sprinkler systems, and an enhanced and expanded standpipe hydrant system with associated equipment to protect several of the most vulnerable structures. The standpipe system upgrade would install new hydrants capable of the required regulatory flow at key location with necessary hose boxes, fire hose, nozzles, and other required equipment. This proposal is needed to address the following management concerns:

- The current inner canyon fire protection systems are grossly inadequate for life and property protection. The lack of personnel stationed in the corridor severely limits personnel- based fire protection programs.
- Several properties on the National Register of Historic Places are at risk.
- Present fire alarms consist only of single station, local alarms, and battery powered smoke detectors in overnight use buildings.
- No buildings have functional sprinkler systems. The few standpipe hydrants are poorly located and can provide only a fraction of the water flow needed for fire suppression.
- The existing water distribution system cannot support fire suppression efforts or any additions such as sprinklers or new hydrants.
- The lack of proven fire protection systems place the employees and visitors at an unacceptable level of potential injury or loss of life and property from fire and violates fire codes and OSHA regulations.

Objectives of the Action

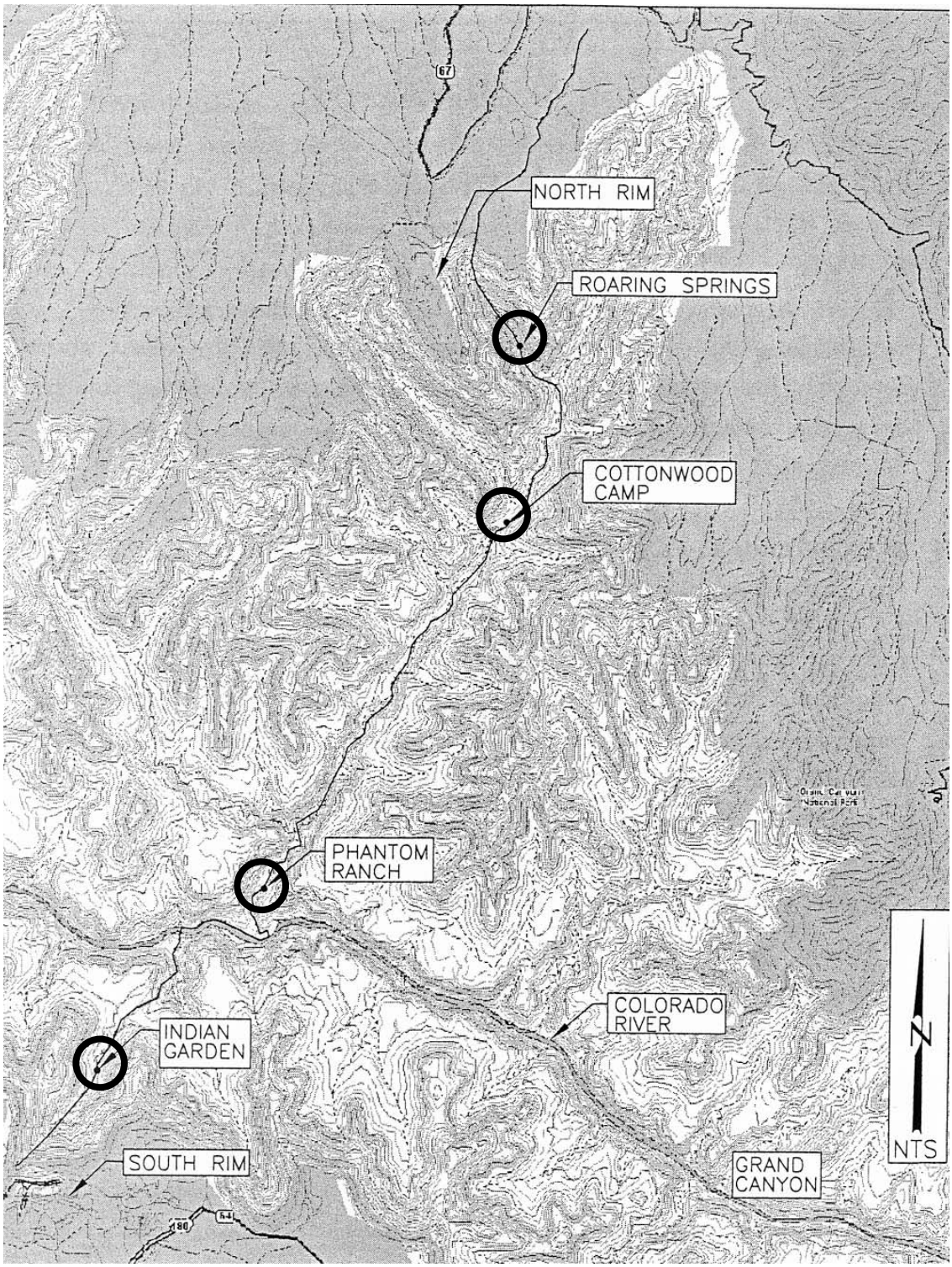
1) Protect park- owned structures, and provide capacity for protection of concessionaire-owned structures within the corridor, from fire.
2) Provide fire alarm system beyond local level.
3) Provide automated sprinkler system in park- owned structures of significant value.
4) Provide new hydrants capable of the required regulatory flows.
5) Provide increased line capacity to adequately supply sprinkler systems and new hydrants.
6) Provide fire protection to employees and visitors, meeting fire codes and OSHA regulations.

Figure 1 - Grand Canyon National Park



Area shown in Figure 2

Figure 2 - Project Areas (Circled)



MANAGEMENT AND PLANNING HISTORY

National Park Service Management Policies 2001 is the guiding document for management of all national park system units. It is the basic Service- wide policy document of the National Park Service and is the highest of three levels of guidance documents in the NPS Directives System. Among direction on all aspects of park management, these Management Policies set forth direction for each unit of the national park system to maintain an up- to- date General Management Plan. GMP Chapter 9 - Park Facilities and Chapter 5 - Cultural Resource Management are also applicable to this project.

Grand Canyon National Park is currently operating under the direction of the *1995 General Management Plan* (GMP). This plan provides guidance for resource management, visitor use, and general development for a period of 10 to 15 years. The primary purpose of the GMP is to provide a foundation from which to protect park resources while providing for meaningful visitor experiences. It focuses on the developed areas of the Park and the Corridor Trails, this includes Roaring Springs, Cottonwood Camp, Phantom Ranch, and Indian Garden. For ease of reference, Appendix A contains excerpts of the pertinent sections of the GMP that apply to this project. The need to protect historic resources is a GMP goal and upgrading the corridor fire suppression system is mentioned in the EIS done for the GMP.

An interdisciplinary team discussed potential issues with the Corridor Area Fire Protection Systems Upgrade during a "Choosing By Advantages" (CBA) exercise in October 2000. This team evaluated the guidelines from the GMP (see above) and evaluated several alternative sites and building layouts for meeting the purpose and need for this project over the course of several months in 2000.

ISSUES

Appropriate federal, state, and local agencies have been contacted for input and review as part of this environmental analysis, including the Arizona State Historic Preservation Office (see Chapter 5 for a list of persons contacted).

Issues with various proposed alternatives were identified by the interdisciplinary team and were brought forward by the public. A public scoping effort was conducted to begin the compliance process. Most responses were in favor of the proposal. One respondent stated that the effort may be wasted because of the threat from wildfire. Issues identified for this project were the potential effects on historic structures, and on Threatened and Endangered species habitat.

Issues and concerns presented during agency consultation and public scoping were distilled into distinct impact topics to facilitate the analysis of environmental consequences, which allows for a standardized comparison between alternatives based on the most relevant information. A summary of the impact topics derived from identified issues and rationale for selection/dismissal is given below.

IMPACT TOPICS

Impact topics were selected for detailed analysis based on substantive issues, environmental statutes, regulations, executive orders, and *NPS Management Policies* (2001). The anticipated impacts of the proposal on these topics is discussed in Chapter 3.

Soils – The proposed project would have impacts on soils from trenching necessary to pipe water from the transcanyon pipeline to the buildings.

Vegetation - Proposed construction would impact existing vegetation wherever ground disturbance occurs.

Special Status Species – The U.S. Fish and Wildlife Service (USFWS) has determined that several threatened, endangered and proposed species have the potential to occur in Coconino County (http:// arizonaes.fws.gov). The Arizona Game and Fish Department has determined that several other special status species should also be considered for projects occurring in Coconino County. The information provided was used to develop a list of species of concern in the project area (see Chapter 3). Section 7 of the Endangered Species Act requires all federal agencies to consult with the U.S. Fish and Wildlife Service to ensure that any action authorized, funded, or carried out by the agency does not jeopardize the continued existence of listed species or critical habitats.

Historic Structures - Direct or indirect impacts to historic structures are expected from implementation of this project. Adding fire protection systems does not require consultation with the State Historic Preservation Office (SHPO) according to the programmatic exclusion IV.B.11 of the 1995 Servicewide Programmatic Agreement among the National Park Service, the Advisory Council on Historic Preservation, and the National Council of State Historic Preservation Officers. The Arizona SHPO will be provided with an Assessment of Effect for the project as a courtesy.

Visitor Experience – The upgrade of the Corridor Area fire protection system would serve an essential public service by providing additional safety to visitors in the Corridor. Visitor experience components that may be affected by this proposal are visual quality and noise.

Park Operations – The upgrade of the Corridor Area fire protection system is designed to improve the safety to employees and structures within the Corridor. This could benefit park staff working in this district and improve operational efficiency.

Impact Topics Dismissed from Further Analysis

Water Quality and Quantity- No surface water would be used in implementing the action alternative. Mitigating measures included in the proposed action would minimize the potential for contamination of surface waters. The adverse impacts potentially resulting from the proposed action would be none to negligible.

Air Quality and Night Sky - Clean, clear air is essential to preserve the resources in Grand Canyon National Park, as well as for visitors to appreciate those resources. Grand Canyon National Park is a federally mandated Class I area under the Clean Air Act. As such, air in the Park receives the most stringent protection against increases in air pollution and in further degradation of air quality related values. The Act then sets a further goal of natural visibility conditions, free of human- caused haze. Air quality in the Park is generally quite good. Pollution levels monitored in the Park fall below the levels established by the Environmental Protection Agency to protect human health and welfare. The ability to see through the air (visibility) is well below natural levels at times because of air pollution. Most of this pollution originates far outside the Park's boundaries, and arrives in the Park as a well-mixed regional haze, rather than as distinct plumes.

Section 118 of the Clean Air Act requires all federal facilities to comply with existing federal, state, and local air pollution control laws and regulations. The scope of this project will not require consultation with the State of Arizona regarding air quality. Because there is some ground disturbance involved, there is a possibility of raising nuisance dust during project implementation or from disturbed areas afterwards. Revegetation of the area disturbed, after work is complete, would provide long- term dust control. Mulch and the plants themselves would stabilize the soil surface and reduce wind speed/shear against the ground surface.

Trenching and other minor on- site work would temporarily increase dust and combustion-related emissions. Dust raised during earth moving activities would be limited by the size of the project and the equipment used. By clearly marking boundaries of the project area, unnecessary soil disturbance, and consequent dust generation, would be avoided. Water sprinkling can control fugitive dust created by construction activities. Exhaust emissions from construction equipment can adversely affect air quality temporarily. Work at Indian Garden may increase dust at the particle sampler located there. The park's Air Quality Specialist would be notified of the dates and times of trenching at that site so air quality data can be annotated (Mitigation Measure #7).

The Corridor Area is in a lightly used development zone. No increase in visitation is anticipated from the upgrade to the fire system. Thus, long- term air quality impacts from visitors, employees and park operations would be unchanged.

In conclusion, local air quality may be temporarily degraded by dust generated from construction activities under the action alternative and emissions from construction equipment. This degradation would result in an overall negligible impact to air quality, and would last only as long as renovation activities occurred. Impacts to overall park air quality or regional air quality are not expected. For these reasons, air quality was dismissed from further analysis.

Neither of the alternatives would cause stray light pollution that could adversely affect night sky viewing.

Floodplains and Wetlands - Executive Order 11988 (Floodplains) and Executive Order 11990 (Wetlands), which require federal agencies to examine the potential impacts of actions on floodplains and wetlands, were reviewed for applicability to this project. The project is not in or near a floodplain and the wetland area near Indian Garden would be avoided. The

proposal would be exempt from the floodplain policy because it is not related to overnight occupation (John Rihs, GRCA hydrologist, personal communication with Ken Tu, August 3, 2000). Therefore, floodplains and wetlands were dismissed from further analysis.

Wildlife - Due to the low level of vegetation disturbance as part of the proposed project, it is not likely that key foraging habitat or nest/roost trees for breeding birds would be disturbed as a result of this project. Wildlife species are not likely to be permanently displaced as a result of this project due to the small amount of disturbance, the fact that no substantial changes in recreational or operational use or timing of use would result, and the availability of similar habitat in the surrounding area.

Archeological Resources, Ethnographic Resources and Cultural Landscapes - Ground disturbing activities have the potential to affect cultural resources. The National Historic Preservation Act, as amended in 1992 (16 USC 470 et seq.), and the National Environmental Policy Act, as well as the National Park Service's Director's Order- 28, Cultural Resource Management Guideline (1998), Management Policies (2001), and Director's Order- 12, Conservation Planning, Environmental Impact Analysis and Decision- making (2001), require the consideration of impacts on cultural resources either listed in or eligible to be listed in the National Register of Historic Places. Section 106 of the National Historic Preservation Act of 1966 requires that federal agencies having direct or indirect jurisdiction over undertakings consider the effect of those undertakings on properties on or eligible for listing on the National Register of Historic Places and afford the Advisory Council on Historic Preservation and the state historic preservation office an opportunity to comment.

Consultations with American Indians are also required for compliance with a variety of laws and other legal entities, such as presidential executive orders, proclamations, and memoranda; federal regulations; and agency management policies and directives. Examples are the Indian self- determination and Education Assistance Act (1975); The American Indian Religious Freedom Act (1978 and as amended in 1994); the native American Graves Protection and Repatriation Act (1990); National Historic Preservation Act (as amended in 1992); the Presidential Memorandum of April 29, 1994, entitled "Government- to- Government Relations With Native American Tribal Governments; and Executive Order 13007 of May 24, 1996, entitled "Indian Sacred Sites." Native American use of the area is known in general terms from ethnographic accounts and on- going consultation with the nine affiliated tribes of Grand Canyon. These tribes were notified of the project by a scoping letter sent at the project's inception.

Direct or indirect impacts to archeological resources are not expected from implementation of this project due to the fact that no archeological sites have been located within the boundaries of the project area nor are any sites in close proximity to the project area. The majority of the work would be occurring in areas already disturbed, interior and exterior of buildings, or directly adjacent to the buildings. Nonetheless, if previously unknown buried deposits are discovered, work would be halted and the Park Archeologist would be consulted immediately and an appropriate mitigation strategy developed, if necessary, in consultation with the Arizona State Historic Preservation Officer and affiliated tribes.

Ethnographic resources are defined by the National Park Service as any "site, structure, object, landscape, or natural resource feature assigned traditional, legendary, religious, subsistence, or

other significance in the cultural system of a group traditionally associated with it" (DO- 28: 181). Scoping indicates that there are no known ethnographic resources in the area of potential effects. Copies of this environmental assessment will be forwarded to each affiliated tribe for review and comment. If tribes subsequently identify the presence of ethnographic resources in the area of potential effects, appropriate mitigation measures would be undertaken in consultation with the tribes. The Navajo Nation responded to scoping and stated that there are no concerns with the project (letter from Navajo Nation, 2002).

Cultural landscapes are broadly defined by the National Park Service as, "a reflection of human adaptation and use of natural resources and is often expressed in the way land is organized and divided, patterns of settlement, land use, systems of circulation, and the types of structures that are built" (Director's Order 28: 87). The character of a cultural landscape may be defined both by physical materials (roads, buildings, walls, and vegetation), uses that reflect cultural values and traditions, and by a sequence of events that contribute to the evolution of the landscape. There are no known National Register listed or eligible landscapes in the area of potential effects. In addition, the proposed action would not alter the topography, vegetation, circulation features, spatial organization, or land use patterns of the landscape. Also any visual, audible, or atmospheric impacts associated with construction would be temporary and negligible, lasting only as long as construction.

Therefore, based on the reasons listed above, Archeological Resources, Ethnographic Resources and Cultural Landscapes are dismissed from further analysis.

Soundcapes - The NPS is mandated by Director's Order 47 to protect, maintain, or restore the natural soundscape resource in a condition unimpaired by inappropriate or excessive noise sources. Implementing the proposed action would generate some construction- related noise in the vicinity above ambient conditions. Noise sources include motorized equipment and power tools. To protect the Park soundscape during project implementation, noise production must occur outside the curfew listed in the mitigation measures developed for this project. Noise impacts from this project would be highly localized and only last the duration of the construction (i.e. adverse, but short- term and negligible). Therefore, this topic is dismissed from further consideration.

Wilderness - Approximately 94% of Grand Canyon National Park has been studied and is recommended for designation as wilderness (NPS 1993). This designation must be done by Congress. In the interim, the acreage is considered Proposed Wilderness. NPS policy is to manage proposed wilderness as if it were designated and not allow any actions that would diminish wilderness suitability. Although the project work sites are not in wilderness, noise from certain helicopter flight legs associated with the proposed action could impact wilderness values (natural sights and sounds) in small portions of the proposed wilderness. This topic is dismissed because no action would take place within proposed wilderness, however, potential indirect impacts to human- related wilderness values are addressed under Visitor Experience and Park Operations.

Environmental Justice - Neither alternative would have disproportionate health or environmental effects on minorities or low- income populations or communities as defined in the Environmental Protection Agency's Draft Environmental Justice Guidance (July 1996). The proposal would improve conditions for all populations regardless of race or income status. Therefore, Environmental Justice was dismissed from further analysis.

Prime and Unique Farmland - Prime or unique farmland is defined as soil that particularly produces general crops as common foods, forage, fiber, and oil seed; unique farmland produces specialty crops such as fruits, vegetables and nuts. According to soil information produced by the Natural Resource Conservation Service, there are no such farmlands associated with the project area (pers. comm., Phil Camp, NRCS 11/02). Therefore, the topic of prime and unique farmland was dismissed from further analysis.

Indian Trust Lands - No lands comprising the project area within Grand Canyon National Park are held in trust by the Secretary of the Interior for the benefit of American Indians due solely to their status as American Indians.

Urban Quality and Design of the Built Environment - Consideration of this topic is required by 40 CFR 1502.16. Urban areas and vernacular designs are not considerations in this type of project.

Energy Requirements and Conservation Potential - Neither alternative would affect the energy requirements or conservation potential of the park.

Socioeconomic – Socioeconomic values consist of local and regional businesses and residents, the local and regional economy and park concessions. The local economy and most business of the communities surrounding the park are based on construction, recreation, transportation, tourist sales, services, and educational research; the regional economy is strongly influenced by tourist activity. The GMP EIS discussed the socioeconomic environment and impacts extensively. There may be short- term benefits to the local and regional economy resulting from construction- related expenditures and employment. Local and regional businesses would be negligibly affected in the long- term. Total impacts, both adverse and beneficial, would be negligible and thus socioeconomic values were dismissed from further analysis.

COMPLIANCE WITH ENVIRONMENTAL PROTECTION MANDATES

The alternatives include all reasonably foreseeable connected actions. Environmental effects estimated for this project consider the site- specific effects of all foreseeable actions and mitigation measures. Monitoring during and following implementation of the project would occur to verify effectiveness of mitigation measures and predictions of impact. This EA will guide any subsequent project implementation. If new information or unforeseen and unanalyzed actions become necessary in the future, additional site- specific environmental analysis will be conducted before implementation. See Appendix B for additional compliance actions.

Chapter 2 – Alternatives

INTRODUCTION

This section describes two management alternatives for this project. In developing alternatives for this project, some actions were considered and subsequently dismissed. Appendix C describes the alternative development process and presents alternatives that were considered but eliminated from detailed analysis and the reasons for their elimination. A summary table comparing alternative components is presented at the end of this chapter.

The preferred alternative is based on preliminary designs and best information available at the time of this writing. Specific distances, areas, and layouts used to describe the alternative are only estimates and could change during final site design. If changes during final site design were not consistent with the intent and effects of the selected alternative, then additional compliance would be prepared as appropriate.

DESCRIPTION OF ALTERNATIVES

Alternatives chosen for this project are described below. Table 2 summarizes the primary components of each alternative and Table 3 summarizes the anticipated impacts from implementation of the alternatives.

Alternative A – No Action

This alternative would not change the existing situation. No changes or improvements would be made to any facilities under this alternative. The corridor area fire protection system would remain in its current, deficient state. The potential for loss of life to visitors and employees would remain, as would the potential for loss of historic structures and related impact to adjacent vegetation through structural fire.

In the No Action alternative, the NPS would respond to future needs and conditions associated with visitor experience and park operations without major actions or changes in current management. No Action does not imply or direct discontinuing present actions or removing existing uses, developments, or facilities.

This alternative would not meet the needs identified in the Purpose and Need for Action section of this document.

Alternative B – Preferred Alternative

This alternative would add fire protection systems to structures at Indian Garden, Phantom Ranch, Cottonwood Camp and Roaring Springs, thus greatly diminishing the risk of loss from structural fires (project drawings attached). Installation of sprinkler systems and related features

would be conducted in accordance with the Secretary of Interior's Standards for the Treatment of Historic Properties.

Indian Garden - Fire sprinkler systems would be installed in four residences, a bunkhouse, a laundry, two pumphouses, and an historic rock house. Four hose stations would also be constructed. Water for the system would come from the Transcanyon Pipeline. About 200 feet of existing 2- inch waterline would be replaced with new 4- inch pipe. About 50 feet of new 6- inch pipe will be laid to bypass the existing sand trap and allow for backfeeding of water to Phantom Ranch. About 25 feet of new 4- inch waterline and pressure reducing valves would be installed in this modification. In addition to the above, about 300 feet of new 2- inch service connection piping would replace existing ¾- inch line, and 150 feet of new ¾- inch service connection pipe would be added for a total of 730 feet of new piping.

Phantom Ranch - A by- pass around the check valve in the transcanyon pipeline south of Indian Garden at Pipe Creek would be installed. This would allow backfeeding to Phantom Ranch when the transcanyon line is out of service north of Phantom Ranch. The existing distribution system would be replaced with new 6" PVC piping and valves. Fire sprinkler systems would be installed in eight structures, four of which are historic. Thirteen new hose stations would be constructed. The new system would continue to be connected to the transcanyon pipeline. New pipe needed for this element would total 5,100 feet and would include lengths of 6, 2, 1½, and ¾ inch pipe sizes.

Cottonwood Camp - A fire alarm system would be installed in the ranger station/residence (this structure already has a fire suppression system) and a sprinkler system would be installed in the composting toilet and connected to existing water supply. One hose station would be replaced. No new underground pipe would be needed at this site.

Roaring Springs - A stand- alone fire sprinkler system would be installed in the residence/ quarters. The fire sprinkler system would be supplied by an exterior 300 gallon water tank pressurized by a nitrogen canister. Fire alarm systems would also be installed in the residence and the pumphouse. No fire sprinkler system is planned for the pumphouse. Two hose stations would be constructed. No new underground pipe would be needed at this site.

Alternative B would provide a high level of protection to historic and other structures. Buildings would be protected by wet pipe sprinkler systems supplied from the Transcanyon Pipeline. The new system would provide a sprinkler flow of 0.15 gpm/ ft^2 over a 900 ft^2 area (135 gpm – six heads at 22.5 gpm each covering 150 ft^2) for 30 minutes. Hose hydrants would provide a flow of 100 gpm with 65 psi at the hydrant. The potable water distribution system, including connections to the Transcanyon Pipeline and pressure reduction, would be improved to carry the required flows. The protection system at Phantom Ranch would be improved but somewhat limited when the Transcanyon Pipeline is out of service until the sand trap by- pass valve at Indian Garden and check valve bypass at Pipe Creek are manually opened. Once these valves are opened, there would be full pressure at Phantom Ranch.

Approximately 5,850 feet of trenching would be needed to install new piping. Some of this would be replacing existing pipe in the same alignment. A typical pipe trench would be 5 to 6 feet deep and about 3 feet across at the surface for an average disturbance width of 6 feet. Trenching and other ground disturbance would result in a total disturbance at the Indian Garden and Phantom Ranch sites of 0.8 to 1 acre.

Equipment Needs

Motorized equipment needed for this project would include a small excavator (*Bobcat*- size), a gasoline- powered trencher, gas- powered tamper, and gas- powered rock drill. The equipment may be flown in and out by helicopter to Indian Garden and Phantom Ranch. Work at Cottonwood Camp and Roaring Spring would require only hand tools (no excavator or trencher) that would be packed into the sites by work crews and mules. The highest noise levels would occur at Phantom Ranch and Indian Garden from the use of motorized construction equipment. None of the sites are in proposed wilderness.

Helicopter ferry may be necessary due to weight of equipment and amount of materials. Construction personnel would walk in or ride in on mules to the sites. Although work sites are not within proposed wilderness, noise from certain helicopter flight legs could impact wilderness values (natural sights and sounds) in small portions of the proposed wilderness. An alternative method considered to conduct this project without helicopter use was to use mules to pack in the equipment and materials. A Minimum Requirement Analysis worksheet is attached as Appendix E.

Mitigating Measures for Alternative B

To minimize resource impacts, the integral design features (i.e. mitigating measures) below would be followed during implementation of the action alternative, and are analyzed as part of the action alternative. These measures were developed to lessen the potential for adverse effects of the proposed action, and have proven to be very effective in reducing environmental impacts on previous projects.

1. Measures will be taken to assure that no surface disturbance or sedimentation should occur in Niobrara ambersnail habitat (Indian Garden). The park biologist will delineate Niobrara ambersnail habitat prior to commencement of construction activities.

2. No construction during the critical breeding period for Mexican spotted owls (February 28 to September 1) would be allowed in areas that might be used by the owls - - Cottonwood Camp and Roaring Spring. No construction in Phantom Ranch during bald eagle wintering season (November through February) if any eagles are present.

3. Conservation measures developed to protect the California condor and Mexican spotted owl would be adhered to during project implementation. This would include confirming distances to the latest known condor nests and Mexican spotted owl protected activity centers and restricting noise related to construction activity when necessary.

4. Personnel conducting the work will be informed to not interact with California condors and to immediately contact the appropriate Park or Peregrine fund personnel when condor(s) occur at the construction site. If a condor occurs at the installation or empty/removal site, activities within 90 meters (300 feet) of the bird will cease until it leaves on its own or until techniques are employed by permitted Park staff or Peregrine Fund personnel which results in the individual condor leaving the area.

5. Construction workers and supervisors would be informed about special status species. Contract provisions would require the cessation of construction activities if a species were discovered in the

project area, until park staff re- evaluates the project. This would allow modification of the contract for any protection measures determined necessary to protect the discovery.

6. Installation of sprinkler systems and other appurtenances would be done in accordance with the Secretary of Interior's Standards for the Treatment of Historic Properties.

7. If dust becomes a problem during work, sprinkling with water would occur to reduce dust in the construction areas. The park's Air Quality Specialist will be notified of the dates and times of trenching at Indian Garden so air quality data collected at that site can be annotated. Power line to the air quality monitoring station at Indian Garden will be noted and avoided by construction crews.

8. Construction equipment would not idle for long periods to reduce noise and air quality impacts on site.

9. Construction zones would be fenced with construction tape, snow fencing, or some similar material before any construction activity. The fencing would define the construction zone and confine activity to the minimum area required for construction. All protection measures would be clearly stated in the construction specifications and workers would be instructed to avoid conducting activities beyond the construction zone as defined by the construction zone fencing.

10. To minimize soil erosion at the project site, standard erosion control measures including silt fence and sandbags would be incorporated into the action alternative. Any trenching operations would use a rock drill, small excavator, trencher, and/or hand excavation with excavated material side- cast for storage and backfilling. Backfilling and compaction would begin immediately after the lines are placed into the trench and the trench surface would be returned to pre- construction contours. All trenching restoration operations would follow guidelines approved by park staff.

11. A Revegetation Plan would be developed for the project by a landscape architect or other qualified individual, in coordination with the Park Restoration Biologist. Any revegetation efforts would use site-adapted native species and/or native seed, and Park policies regarding revegetation and site restoration would be incorporated into the plan. The plan would incorporate, among other things, the use of native species, plant salvage potential, exotic vegetation and noxious weeds, and pedestrian barriers.

12. To prevent and minimize the spread of exotic vegetation and noxious weeds, the Revegetation Plan would be followed. The following mitigation measures would be implemented, and would be incorporated into the plan

    - Existing populations of exotic vegetation at the construction site would be treated before construction activities.
    - All construction equipment brought in from outside the park would be pressure washed before transport to the construction site.
    - The location of the staging areas would be limited to existing disturbed areas.
    - All areas disturbed by construction would be revegetated using site- adapted native seed and/or plants if available.
    - Post- project exotic plant monitoring should also be conducted in the project area, as time and funding allows.

13. All workers would be informed of the penalties for illegally collecting artifacts or intentionally damaging any archeological or historic property. Workers would also be informed of the correct procedures if previously unknown resources were uncovered during construction activities. Data recovery excavations would be carried out to mitigate adverse affects as outlined in the section on environmental consequences.

14. The NPS has conducted archeological surveys to identify resources in the project area and no archeological sites were discovered. However, archeological monitoring would accompany

construction (especially areas where trenching is required) as necessary to ensure avoidance or appropriate treatment of uncovered resources. A Park Service Cultural Resource Specialist will be on site to carry out the monitoring. Should presently unknown archeological resources be discovered during construction, work would stop in that area until the resources are properly evaluated and treatment measures are carried out as necessary in consultation with the Arizona SHPO. In the event that human remains, funerary objects, sacred objects, or objects of cultural patrimony are discovered during construction, the NPS would follow provisions outlined in the Native American Graves Protection and Repatriation Act of 1990.

15. Consistent with the *Secretary of Interior's Standards for Rehabilitation* and the historic usage of buildings and structures included in the project, alarm systems and fire suppression sprinkler heads and pipes would be concealed to the extent practical. These would also be installed in a manner that minimizes loss or disturbance of historic fabric while similarly maintaining the functional livability of occupied or residential interior spaces. To further ensure achievement of these objectives, the contractor selected to install the fire suppression systems would meet on- site with the Park Historical Architect to field verify and approve the pipe routing and configuration, access holes, riser enclosures and the appropriate number and location of sprinkler heads. The contractor would delineate this information on shop drawings that would be approved by the Park Historical Architect.

16. If helicopters are used, flights would be scheduled during the off- peak backcountry season, to minimize disturbance to visitors. The flight path selected for delivery and removal of equipment would be developed so as to minimize the time that the helicopter is in the canyon, i.e. dog- leg flight paths that stay over forested areas the longest, and using direct flights to the sites to minimize noise disturbance in the inner canyon.

17. To minimize the potential for impacts to park visitors, work will be done on only one site at a time. In addition, variations on construction timing would be considered. Options include conducting the majority of the work in the off- season (winter) or shoulder seasons and implementing daily construction activity curfews. Unless additional time is authorized by park management, operation of construction equipment would not occur between the hours of 6 PM to 7 AM in summer (May – September), and 6 PM to 8 AM in the winter (October – April), to minimize the impacts of noise from construction activities to visitors and the Canyon's natural quiet.

18. Inner Canyon Helicopter Regulations, found in Appendix E, will be adhered to.

Identification of the Environmentally Preferred Alternative

The Council on Environmental Quality (CEQ) provides direction that "[t]he environmentally preferable alternative is the alternative that will promote the national environmental policy as expressed in NEPA's Section 101. The environmentally preferred alternative is determined by applying the criteria suggested in the National Environmental Policy Act of 1969 (NEPA), which guides the CEQ:

1. fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;
2. assure for all generations safe, healthful, productive, and esthetically and culturally pleasing surroundings;
3. attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences;

4. preserve important historic, cultural and natural aspects of our national heritage and maintain, wherever possible, an environment that supports diversity and variety of individual choice;
5. achieve a balance between population and resource use that will permit high standards of living and a wide sharing of life's amenities; and
6. enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

Alternative A would not result in any disturbance of natural resources (Criterion 1 partially met) but would allow greater risk to visitor and employees safety and risk of loss to historic and park operations structures (Criteria 2, 3, 4, 5, and 6 not met).

Alternative B would result in disturbance to a total of less than one acre in semi- developed areas but would substantially reduce the risk of loss to park structures. It would also improve visitor and employee safety (Criteria 1, 2, 3, 4 and 5 met).

Using selection factors from the Choosing by Advantages process and through the process of internal scoping, scoping with the public and other agencies, the environmentally preferred alternative was determined to be Alternative B. Alternative B would best meet the purpose and need for action while addressing the NEPA criteria stated above, overall Park Service objectives and other evaluation factors. No new information came forward from public scoping or consultation with other agencies to necessitate the development of any new alternatives, other than those described and evaluated in this document. The action alternative addresses the purpose and need for action and would fully achieve all identified project objectives.

Summary Tables

Table 1. Summary of Alternative Components

Component	Alternative A No Action	Alternative B Preferred Alternative
Sprinkler Systems	No sprinklers installed	Fire sprinkler systems installed in 19 structures
Hose Stations	No existing hose stations	Twenty- one hose stations installed
Other Facility Improvements	No improvement actions taken	Fire Intrusion and alarm systems installed Improved water supply to Phantom Ranch when the transcanyon line is down north of Phantom Ranch Increased drinking water supply for visitors
Site work	No additional ground disturbance	Trenching and other minor site work necessary (maximum of ½ acre disturbed)
Accomplishment of Project Objectives	Does not achieve project objectives	Achieves all project objectives and addresses purpose and need

Table 2. Summary Comparison of Anticipated Impacts

Impact Topic	Alternative A – No Action	Alternative B – Preferred Alternative
Soils	No effect on soils.	Long- term, negligible to minor adverse impacts to soils.
Vegetation	No effect on vegetative resources.	Long- term, negligible adverse impacts to vegetation.
Special Status Species	Populations generally remain the same; no effect to listed species or other sensitive fish and wildlife.	This alternative may effect, but is not likely to adversely affect, Niobrara ambersnail, California condor, Mexican spotted owl, bald eagle. There would be no effect to humpback chub or razorback sucker and no effect on critical habitat for Mexican spotted owl or listed fishes.
Historic Structures	Alternative A would have no effect on historic structures or the Historic District. The risk of damage or loss from fire would continue.	Moderate, long- term beneficial impact to the Cross Canyon Historic District by increasing protection from fire.
Visitor Experience	Alternative A would cause the continuation of short- term, moderate adverse impacts to visitors.	Alternative B would result in a long-term moderate benefits to visitor experience by providing safer visitor facilities. Short- term, minor adverse impacts to the visitor experience may occur during construction.
Park Operations	Alternative A would result in a moderate, long- term adverse impact to park operations due to the inadequacy of existing fire protection at Corridor Area facilities.	Alternative B would result in a moderate, long- term beneficial impact to park operations by providing greater protection for park facilities.

Chapter 3 – Affected Environment and Environmental Consequences

INTRODUCTION

This Chapter describes the present condition (i.e. affected environment) within the project area and the changes (i.e. environmental consequences) that can be expected from implementing the action alternatives or taking no action at this time. The no action alternative sets the environmental baseline for comparing the effects to the other alternative. The impact topics (see Chapter 1) define the scope of the environmental concern for this project. The environmental effects, or changes from the present baseline condition, described in this chapter reflect the identified relevant impact topics, and include the intensity and duration of the action, mitigation measures and cumulative effects.

The National Environmental Policy Act (NEPA) requires that environmental documents disclose the environmental impacts of proposed federal action, reasonable alternatives to that action, and any adverse environmental effects that cannot be avoided should the proposed action be implemented.

Grand Canyon National Park encompasses approximately 1.2 million acres in northern Arizona. The project is located at four sites within the Corridor Area of the park.

Impact Analyses

The impact analyses and conclusions contained in this chapter were based on park staff knowledge of the resources and site; review of existing literature and park studies; information provided by specialists within the National Park Service and other agencies; and professional judgement. Detailed information on natural and cultural resources in Grand Canyon National Park that is summarized in the 1995 GMP and associated Environmental Impact Statement (EIS) was specifically referenced for information on affected resources in the project area.

This section of the document analyzes the anticipated environmental consequences to the resources identified in the previous section that may result from implementation of the alternatives. Potential impacts are described in terms of type, duration, context (local, state, regional or national) and intensity (negligible, minor, moderate, or major). Because definitions of intensity vary by impact topic, intensity definitions are provided separately for each impact topic. The following definitions apply to all impact topics.

Duration: Duration of impacts is defined as follows:

- Short- term – impacts that would be less than 5 years duration. Five years was selected as the difference between short and long- term due to the length of construction (1- 2 years) plus the length of revegetation and post- treatments (2- 3 years).
- Long- term – impacts that would be about 5 years or more in duration.

Cumulative Impacts

Cumulative impact is defined as the impacts on the environment which result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non- federal) or person undertakes such other actions. Cumulative impacts can result from individually minor, but collectively significant actions, taking place over a period of time (40 CFR 1508.7). Therefore, it is necessary to identify other ongoing or foreseeable future actions within the vicinity of the project area.

A cumulative impact analysis was conducted for the full implementation of the GMP and is documented in the EIS. The general finding in the EIS for cumulative effects to natural resources was a net reduction in natural habitat within the park and the region, but a net reduction less than that for two other alternatives analyzed. Cumulative effects to archeological resources could occur, specifically to traditional cultural properties, but a planned ethnographic survey program would minimize this likelihood. Cumulative effects were not expected to historic structures under the assumption that existing cultural resources within the park would be protected and preserved and some historic buildings would be rehabilitated and restored. Because the GMP was a general concept plan and because it required site- specific analysis for projects identified in the GMP during planning, a cumulative effects analysis that is more specific to the planned projects is needed.

Past actions that have affected the environment in the area of the proposed action include construction and use of the structures, campsites and other amenities at the four sites; construction and maintenance of the Transcanyon Pipeline with its associated facilities; construction and use of the corridor trails; and heavy visitor and park operation use in the corridor area. These actions have affected soils, vegetation and wildlife at the four project sites and along the major trails.

For this analysis, foreseeable future actions were considered actions that could occur in Corridor Area within the next 5 years that currently have funding or for which funding is being sought. Five years was selected as the period for foreseeable future actions because many of the actions identified in the GMP are likely to either be planned or implemented by that time. The area of impact was chosen to be Corridor Area due to the potential for impacts of multiple actions on park operations and visitor experience in this area. Because implementation of this project is expected to result in minimal impact to the natural environment, a watershed analysis was not used for this project. Cultural resource impacts are also expected to be minimal with implementation of this project and, therefore, historic district boundaries were not used further in a cumulative impact analysis.

Foreseeable future actions that have occurred or could occur in Corridor Area are listed and discussed briefly below.

Backcountry and Corridor Restrooms. Construction or rehabilitation of restroom facilities would occur throughout the Corridor, including locations at Three Mile and Phantom Ranch. This would occur as part of a park- wide restroom restoration effort. Planning for this project is currently underway. Implementation would occur within the next five years. This project would replace existing structures and would result in minimal impacts. Ground disturbance for the Backcountry and Corridor Restrooms project is estimated at 0.2 acres.

Other planned or ongoing projects that would affect visitor opportunities outside the corridor area include the Greenway Trail, Mather Campground rehabilitation, Heritage Education Campus, and consolidation of the backcountry and river permitting facilities.

Impairment Of Park Resources Or Values

In addition to determining the environmental consequences of implementing the alternatives, National Park Service policy (*Management Policies 2001,* §1.4.4) requires analysis of potential effects to determine whether actions would impair park resources.

The fundamental purpose of the national park system, established by the Organic Act and reaffirmed by the General Authorities Act, as amended, begins with a mandate to conserve park resources and values. National Park Service managers must always seek ways to avoid, or to minimize to the greatest degree practicable, adverse impacts on park resources and values. However, the laws do give the National Park Service the management discretion to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of a park, as long as the impact does not constitute impairment of the affected resources and values. Although Congress has given the National Park Service the management discretion to allow certain impacts within parks, that discretion is limited by the statutory requirement that the National Park Service must leave park resources and values unimpaired, unless a particular law directly and specifically provides otherwise. The prohibited impairment is an impact that, in the professional judgment of the responsible National Park Service manager, would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values. An impact to any park resource or value may constitute impairment. An impact would be more likely to constitute impairment to the extent that it affects a resource or value whose conservation is:

- necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park;
- key to the natural or cultural integrity of the park; or
- Identified as a goal in the park's general management plan or other relevant NPS planning documents.

Impairment could result from National Park Service activities in managing the park, visitor activities, or activities undertaken by concessioners, contractors, and others operating in the park. The potential for impairment is discussed for each resource for each alternative in this chapter and a statement summarizing the conclusions of this evaluation is included in the conclusion statement at the end of the environmental consequences section for each resource in this chapter.

NATURAL RESOURCES

Available information on known natural resources was compiled. Where possible, map locations of sensitive resources were compared with locations of proposed developments and modifications of existing facilities. Predictions about short- and long- term site impacts were based on previous studies of construction and visitor impacts to natural resources and recent monitoring data from Grand Canyon National Park.

SOILS

Affected Environment

Soils tend to be shallow and poorly developed but stable, with frequent rock outcroppings. The shallow, well- drained soils are a result of weathering of the base rock - - limestone and sandstone - - and so tend to be rocky and sandy loams. Indian Garden is located where Garden Creek cuts through the broad bench of the Tonto Plateau. Phantom Ranch is located on alluvium deposited by Bright Angel Creek near its confluence with the Colorado River. Cottonwood Camp is on a stream terrace and alluvial fan near the confluence of Transept Canyon and Bright Angel Creek. The Roaring Springs residence is on a stream terrace and the Roaring Springs day use area is on the slope of the canyon below Roaring Springs (NPS 1995).

Environmental Consequences

Methodology

The thresholds of change for the intensity of an impact are defined as follows:

Negligible: Soils would not be affected or the effects to soils would be below or at the lower levels of detection. Any effects to soil productivity or fertility would be slight and no long-term effects to soils would occur.

Minor: The effects to soils would be detectable. Effects to soil productivity or fertility would be small, as would the area affected. If mitigation were needed to offset adverse effects, it would be relatively simple to implement and would likely be successful.

Moderate: The effect on soil productivity or fertility would be readily apparent, likely long- term, and result in a change to the soil character over a relatively wide area. Mitigation measures would probably be necessary to offset adverse effects and would likely be successful.

Major: The effect on soil productivity or fertility would be readily apparent, long- term, and substantially change the character of the soils over a large area in and out of the park. Mitigation measures to offset adverse effects would be necessary, extensive, and their success could not be guaranteed.

Alternative A - No Action

There would be no ground disturbance resulting from this alternative, so there would be no effect on soils.

Alternative B - Preferred

Implementing this alternative would affect a maximum of one acre of soil in the Indian Garden and Phantom Ranch sites. Impacts to soils would occur where trenching is done to bury the waterlines. Construction would cause soil to be excavated by the trenching equipment and then replaced in approximately the same location and tamped following placement of the pipe. Disturbed soils would be subject to some compaction and displacement. This would result in adverse effects on soil properties such as porosity, water infiltration rates, water holding capacity, and surface runoff rates. These impacts would be short- term and only negligible to minor due to previous disturbance and the shallow, course, and stony nature of the soils at the sites. There is a small potential for soil movement off- site from precipitation while it is temporarily stockpiled during construction but mitigation measures included in the preferred alternative would be implemented to prevent soil erosion during project work. Disturbed sites would be revegetated with desired plants according to a Revegetation Plan prepared by park staff. This would reduce the risk of post- construction soil erosion.

Cumulative Impacts

Impacts to soils in and around Grand Canyon are occurring on lands managed by the federal government, state of Arizona and private landowners. In the past, present and foreseeable future these impacts could include road construction or improvement; livestock grazing; mineral extraction; construction of homes, businesses and associated utility lines; fences; and development associated with public use of park units and private lands. Actions such as these can cause long- term adverse impacts to soils from displacement or compaction which can affect percolation and water- holding capabilities. Ground disturbance can also increase susceptibility to erosion or loss of topsoil from wind or water. The impact of the preferred alternative would be a small component of the overall cumulative effect. The adverse impacts of the preferred alternative, when combined with the impacts of other reasonable foreseeable future actions, would result in minor adverse cumulative impacts to soils in the region.

Conclusions

<u>Alternative A - No Action</u>
Alternative A would have no impact on soils.

<u>Alternative B - Preferred</u>
Alternative B would cause long- term, negligible to minor adverse impacts to soils.

Because there would be no major, adverse impacts to a key resource or value of Grand Canyon National Park, there would be no impairment of park resources or values.

VEGETATION

Affected Environment

Vegetative communities vary by elevation. Near the north and south rims, pinyon- juniper woodlands prevail. As one descends the Bright Angel Trail or North Kaibab Trail, the vegetation gradually becomes desert scrub, dominated by black brush. In the lower elevations of the inner gorge along the corridor trails, Sonoran Desert vegetation dominates outside the riparian zones. Riparian communities dominate the inner gorge along the Colorado River, its tributaries, and springs and seeps. Riparian scrub communities occur along ephemeral and intermittent systems. Riparian forest and woodland communities associated with large spring systems are highly diverse in Grand Canyon. Side canyons throughout the park are characterized by cottonwood (*Populus fremontii*) and willow (*Salix spp.*) Riparian vegetation is present at Indian Garden, Phantom Ranch and Roaring Springs.

Exotic Vegetation
Almost 150 exotic plant species are known to exist in the South Rim area of Grand Canyon National Park. Of these approximately 150 exotic plant species, ten are listed on Arizona's noxious weed list. These species and status are:

Chondrilla juncea - rush skeletonweed - prohibited
Aegilops cylindrica - jointed goatgrass - restricted
Alhagi camelorum - camelthorn - restricted
Cardiara draba - white top - restricted
Centaurea maculosa - spotted knapweed - restricted
Linaria dalmatica - Dalmatian toadflax - restricted
Onopardum acenthium - scotch thistle - restricted
Cenchrus incertus - field sandbur - regulated
Convolvulus arvensis - field bindweed - regulated
Tribulus terrestris - puncture vine - regulated

The main concerns with exotic vegetation and noxious weeds are spread of existing populations and introduction of new invaders. The number of existing exotic plant species present at a proposed site can be used to indicate the potential spread of existing populations. The potential still exists for exotic populations to spread which would be a long- term adverse effect on native vegetation. The level of ground disturbance can be used to indicate the potential introduction of new invaders. Generally, disturbed areas favor the establishment of exotic vegetation. Therefore, the more ground disturbance that occurs generally results in a higher risk of introduction.

All action alternatives would implement post- construction monitoring, revegetation efforts, and control treatments if necessary to contain an introduction if one were to occur.

Environmental Consequences

Methodology

The thresholds of change for the intensity of an impact are defined as follows:

Negligible: an action that could result in a change to individual plants or a population, but the change would be so small that it would not be of any measurable or perceptible consequence.

Minor: an action that could result in a change to individual plants or a population. The change would be small and localized and of little consequence.

Moderate: an action that would result in some change to individual plants or a population. The change would be measurable and of consequence to the resource but more localized.

Major: an action that would have a noticeable change to a population. The change would be measurable and result in a severely adverse or major beneficial impact, and possible permanent consequence, upon the population.

Alternative A - No Action
There would be no ground or vegetative disturbance resulting from this alternative, so it would have no effect on vegetation or the spread of exotic vegetation.

Alternative B - Preferred
Vegetation existing along the trench lines would be lost under this alternative. There would be the opportunity for salvage of sensitive plants if warranted. A total of one acre or less of short- term ground disturbance at Indian Garden and Phantom Ranch would occur. The one acre is composed of vegetation that is common in the Corridor Area of the park and has been somewhat disturbed by prior modifications and uses of the sites.

Some of the exotic plants currently found at Indian Garden would be consequently removed by construction. Disturbed sites would be revegetated with desired species according to a Revegetation Plan prepared by park staff. This and other mitigation would prevent the spread of invasive exotic plants.

Because of these factors, overall impacts would constitute a long term, negligible adverse impact on vegetation.

Cumulative Impacts
Impacts to biotic communities in and around Grand Canyon are occurring on lands managed by the federal government, state of Arizona and private landowners. In the past, present and foreseeable future these impacts could include road construction or improvement; livestock grazing; mineral extraction; construction of homes, businesses and associated utility lines; fences; and development associated with public use of park units and private lands. Actions such as these can disrupt and destroy native vegetation or introduce exotic species that could out- compete native plants for limited resources. The impact of the preferred alternative would also be a small component of the overall cumulative effect and in conjunction with the adverse impacts of other reasonable foreseeable future actions, would result in minor adverse cumulative impacts to vegetation in the region.

Conclusions
<u>Alternative A - No Action</u>

No impact on vegetative resources.

Alternative B - Preferred

Due to the limited size and extent of the ground disturbance proposed for this project, the fact that the area is located within previously disturbed areas of the Corridor Area, and the adherence to mitigation measures developed for exotic species and plant restoration, impacts to native vegetation would be long- term and adverse but negligible.

There would be no impairment of Grand Canyon National Park's resources or values as a result of either alternative.

SPECIAL STATUS SPECIES

Affected Environment

The U.S. Fish and Wildlife Service indicates that there are 19 federally listed species, one proposed and two candidate species in Coconino County (http://arizonaes.fws.gov). Of the ten federally listed wildlife and plant species that are known to occur or are likely to occur in Grand Canyon National Park, six may occur on or near the project areas. Table 3 includes a list of threatened, endangered, proposed, and species of concern known to occur in the project vicinity, species whose habitat may be present in project area, or species who might otherwise be impacted by project actions. There are no confirmed nest locations for special status birds in the project areas, although condors have been observed in the project vicinity at Phantom Ranch.

A single adult bald eagle occurs regularly in the winter along Bright Angel Creek, roosting in riparian habitat along a 0.25 mile stretch of creek between the campground and the development at Phantom Ranch. Foraging areas and night roosts for this eagle are along Pipe Creek to Cottonwood Camp.

The nearest Mexican spotted owl Protected Activity Centers are over 1 mile from the project area at Cottonwood Camp and ½ mile from the project area at Roaring Spring. Critical breeding period for spotted owls is February 28 to September 1.

The list in Table 3 was developed from personal knowledge of the area by park biologists, park records, the AGFD Heritage Nongame Data Management System database (2000), and Arizona Game and Fish Department and U.S. Fish and Wildlife Service biologists.

If impacts to listed species are anticipated, a detailed analysis of the expected effects of this project on listed species will be addressed in a separate Biological Assessment submitted to the U.S. Fish and Wildlife Service in compliance with Section 7 of the Endangered Species Act. Table 5 is a summary of special status species pertinent to this project, based on known occurrences and habitat preferences. A brief description of the listed species with the potential to be affected by this project is included in Appendix D.

Table 3. Special Status Species pertinent to this project

Common Name	Species	Status	Project Vicinity Occurrence
Niobrara Ambersnail	*Oxylohma h. haydeni*	T*	Yes; Occupied habitat near project area at Indian Garden. Project- specific surveys will be completed and habitat marked prior to construction.
Mexican Spotted Owl	*Strix occidentalis lucida*	T, WC	Yes; The nearest MSO PACs are over 1 mile from the project area at Cottonwood Camp and ½ mile from the project area at Roaring Spring.
California Condor	*Gymnogyps californicus*	T**, WC	Yes; May appear at Phantom Ranch, but project areas not suitable for nesting or roosting.
Bald Eagle	*Haliaeetus leucocephalus*	T	Yes; one bald eagle is known to frequent the Phantom Ranch area during the winter.
Humpback Chub	*Gila cypha*	E	Possible; found in Colorado River between Nevada and Arizona
Razorback Sucker	*Xyrauchen texanus*	E	Possible; Found in Colorado River (which is near Phantom Ranch site)

Key: *T = federally listed as threatened under the Endangered Species Act (ESA); E = federally listed as endangered under the ESA; WC = Wildlife species of special concern in Arizona (AZ Game and Fish Department 1996); T* Not listed, but related to endangered Kanab ambersnail and need to protect species until taxonomy is determined. T** = federally listed as an experimental non- essential population in Arizona (ESA Section 10j), but in National Parks the species is considered as if it were fully protected.*

Environmental Consequences

Methodology

Information on possible threatened, endangered, candidate species and species of special concern was gathered from available information and prior research at the park. Known locations of habitat associated with listed species and species of special concern were compared with locations of proposed developments and modifications of existing facilities. Known impacts caused by similar projects were also considered.

The thresholds of change for the intensity of an impact are defined as follows:

Negligible: an action that could result in a change to a population or individuals of a species or designated critical habitat, but the change would be so small that it would not be of any measurable or perceptible consequence. The change would result in a *no effect* opinion from the U.S. Fish and Wildlife Service.

Minor: an action that could result in a change to a population or individuals of a species or designated critical habitat. The change would be measurable but small and localized

and of little consequence, and result in a *not likely to adversely effect* opinion from the U.S. Fish and Wildlife Service.

Moderate: an action that would result in some change to a population or individuals of a species or designated critical habitat. The change would be measurable and of consequence but likely result in a *not likely to adversely effect* opinion from the U.S. Fish and Wildlife Service.

Major: an action that would result in a noticeable change to a population or individuals of a species or resource or designated critical habitat. The change would result in a *likely to adversely effect* opinion from the U.S. Fish and Wildlife Service.

Alternative A - No Action

The no action alternative would maintain the project area in its current state and would continue to provide habitat in the project area for many wildlife species, although habitat quality in the immediate area would remain low due to the lack of existing vegetation and the high level of development. Without a change in vegetation or human use in the project area, wildlife populations would generally remain the same. Selection of the no action alternative would not affect listed species in the project vicinity, or their habitat, beyond the on- going impacts of visitation and human activity that have been occurring in this area for many years. Continued use of the sites would not impact any sensitive wildlife habitat requirements such as nesting and/or roosting sites, key foraging areas, key calving or fawning areas, or primary wildlife travel corridors. Selection of the no action alternative would therefore have no effect on fish or wildlife including species of interest or species of concern listed above.

Impacts of Alternative B – Preferred Alternative

Impacts to special status species as a result of implementation of the action alternative would be primarily a result of noise disturbance from construction activity, and not from disturbance of habitat. Construction would require light construction equipment and would result in an increased level of noise and human activity around the construction sites. This could result in short- term disturbance of wildlife in the surrounding area. As previously stated, relatively little ground or vegetation disturbance is expected from project implementation. Actions are restricted to the buildings and the immediate surrounding area, and are not likely to result in substantial changes in wildlife use of the area. It is unlikely that species of concern or special status species rely on habitat surrounding the buildings as essential habitat due to its previously disturbed nature.

Due to the low level of vegetation disturbance as part of this project, it is not likely that key foraging habitat or nest/roost trees for breeding birds would be disturbed as a result of this project. Wildlife species are not likely to be permanently displaced as a result of this project due to the small amount of disturbance, the fact that no substantial changes in recreational or operational use or timing of use would result, and the availability of similar habitat in the surrounding area. Therefore, adverse impacts are expected to be negligible and short- term.

Implementation of minimization measures (mitigation measures), identified in this EA as part of the project, would ensure that adverse effects do not occur. If an eagle is observed by park staff in

the Phantom Ranch area during the construction period, construction would be rescheduled to avoid adverse impacts. No construction during the critical breeding period for spotted owls (February 28 to September 1) would be allowed in areas that might be used by the owls - - Cottonwood Camp and Roaring Spring. No motorized equipment would be allowed during condor nesting season at Indian Garden.

Colorado River fish habitat would not be affected by this alternative. No construction activity would occur in tributaries that could cause sedimentation or affect water quality. No Colorado River water would be withdrawn.

Implementation of this project may affect, but is not likely to adversely affect the Mexican spotted owl. It may affect, but is not likely to adversely affect California condor due to the potential of human- condor interaction during construction. It may affect, but is not likely to adversely affect the bald eagle because of the potential for construction- related noise. There would be no effect on humpback chub or razorback sucker.

A Biological Assessment was prepared and submitted to the U.S. Fish and Wildlife Service (USFWS). The USFWS concurred with the determinations made in this EA and the Biological Assessment in a memorandum dated March 19, 2003.

Cumulative Impacts

Contributions of the proposal to cumulative impacts to sensitive species are not expected to be more than neglibible due to the limited scope of the project and the lack of substantial habitat disturbance. Combining this project with others planned in Grand Canyon over the next several years would likely result in minor impacts to wildlife habitat and wildlife use in the canyon. These impacts are expected to be negligible due to the limited scope of this and other planned projects and the short- term nature of the disturbance related to construction noise. Although habitat may be disturbed and vegetation removed for some projects, this is not expected to substantially change the existing habitat components within the park over the long- term. Implementation of mitigation measures for each project to address vegetation restoration, exotic species management, and short- term construction noise effects should help to ensure that major adverse impacts do not occur. Project implementation in this area over the next five years is not expected to result in adverse cumulative impacts to wildlife or specials status species.

Conclusions and Determinations:

No Action Alternative

The no action alternative would maintain the existing wildlife habitat in the project area and would not result in noise impacts other than those typical of the areas. There would be no effect on listed or other fish and wildlife species of concern.

Preferred Alternative

Implementing the action alternative may effect, but is not likely to adversely affect, Niobrara ambersnail, California condor, Mexican spotted owl, or bald eagle. There would be no effect to humpback chub or razorback sucker and no effect on critical habitat for Mexican spotted owl or listed fishes.

Impacts occurring from either alternative would not result in impairment of park resources.

HISTORIC STRUCTURES

Affected Environment

The NPS has conducted an evaluated inventory of all historic and prehistoric structures that have historical, architectural, and/or engineering significance within the park. This List of Classified Structures (LCS) was evaluated or "classified" by the National Register of Historic Places criteria.

Historic structures exist at Indian Garden, Phantom Ranch and Cottonwood Camp and some are included in the undertaking. Proposed actions on structures contributing to the significance of the Cross Canyon Historic District listing on the National Register of Historic Places are described below (proposed actions on non- historic buildings are described elsewhere in this document). These structures are significant based on National Register criteria A (referring to association with historical events) and criteria C (referring to architectural significance). Also included in the Historic District are the Bright Angel Trail, North Kaibab Trail, and South Kaibab Trail (not in project area).

Indian Garden – This area is located on the south side of the Colorado River about halfway between the South Rim and Phantom Ranch. Wet pipe fire sprinkler systems and alarm systems would be installed in the historic rock house (Bldg. 18; originally a pump tender's residence built in 1943 by the Atchison, Topeka and Santa Fe Railway, and donated to the NPS in 1953). The historic south pumphouse (Bldg. 31) would only have a fire alarm system installed.

Phantom Ranch (south) - This area is along the Kaibab Trail south of the Bright Angel Creek bridge. Four of the buildings under project consideration in this area are historic: the rock house (Bldg. 154; built prior to 1928 of stone piers and exposed heavy timber framing); river ranger station (Bldg. 91; built between 1928 and 1935 of stone piers and wood frame walls); the mule shelter (Bldg. 222; semi- circular wood frame and stone structure built by the CCC in 1935); and the wastewater treatment plant operator's house (Bldg. 869).

Phantom Ranch (north) – This part of Phantom Ranch is located on the north side of the Colorado River at the confluence with Bright Angel Creek. Proposed work items consist of fire alarm installation in the historic bunkhouse (Bldg. 875), and connection of the existing fire suppression and potable water systems in the bunkhouse and the ranger station (Bldg. 440; originally built in 1966 as a USGS residence) to new water distribution lines.

Cottonwood Camp – This area (about 2 ½ miles south of Roaring Springs) includes an historic stone and wood- frame ranger station/residence (Bldg. 92, constructed in 1927).

Bright Angel Trail and *North Kaibab Trail* are contributing elements of the Cross Canyon Corridor Historic District. They are representative of the first trails into the inner canyon in addition to being the most popular trails throughout the history of public visitation at Grand Canyon.

Environmental Consequences

Methodology

In order for a structure or building to be listed in the National Register of Historic Places, it must be associated with an important historic context, i.e. possess significance – the meaning or value ascribed to the structure or building, *and* have integrity of those features necessary to convey its significance. For purposes of analyzing potential impacts to historic structures/buildings, the thresholds of change for the intensity of an impact are defined as follows:

Negligible: Impact(s) is at the lowest levels of detection - barely perceptible and not measurable. For purposes of Section 106, the determination of effect would be *no adverse effect*.

Minor: **Adverse impact** - impact would not affect the character defining features of a National Register of Historic Places eligible or listed District. For purposes of Section 106, the determination of effect would be *no adverse effect*.

Beneficial impact - stabilization/ preservation of character defining features in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties*, to maintain existing integrity of a structure or building. For purposes of Section 106, the determination of effect would be *no adverse effect*.

Moderate: **Adverse impact** - impact would alter a character defining feature(s) of the District but would not diminish the integrity of the resource to the extent that its National Register eligibility is jeopardized. For purposes of Section 106, the determination of effect would be *no adverse effect*.

Beneficial impact – rehabilitation of a structure or building in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties*, to make possible a compatible use of the property while preserving its character defining features. For purposes of Section 106, the determination of effect would be *no adverse effect*.

Major: **Adverse impact** - impact would alter a character defining feature(s) of the District, diminishing the integrity of the resource to the extent that it is no longer eligible to be listed in the National Register. For purposes of Section 106, the determination of effect would be *adverse effect*.

Beneficial impact – restoration in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties*, to accurately depict the form, features, and character of a structure or building as it appeared during its period of significance. For purposes of Section 106, the determination of effect would be *no adverse effect*.

Alternative A - No Action

The No Action Alternative would continue current conditions and not directly affect historic structures or the integrity of the Historic District. However, it would not address the lack of proven fire protection and would continue to place historic structures at risk of damage or loss from fire. Continuation of the current situation would cause no project- related impacts to historic structures.

Alternative B - Preferred
This action would have negligible adverse impacts to individual structures resulting from installation of the fire protection systems. These impacts may include drilling holes in walls and ceilings and installing non- historic features. These actions may adversely affect the historic fabric of individual structures but would not affect the values that led to listing of the Historic District or eligibility for listing of other structures on the National Register. Implementation of specific mitigation measures would ensure that undue impacts to historic resources do not occur.

This alternative would benefit the Historic District by adding fire detection and suppression systems. Overall, moderate, long- term beneficial impacts to historic structures would be achieved.

Cumulative Impacts
Some historic structures at Grand Canyon NP have been adversely impacted from past construction disturbance, perhaps occurring before establishment of the park and/or as a result of inadvertent impacts prior to the legal requirements for resource inventory, site protection, and mitigation. Combined with continued visitor use in the area, other current and foreseeable construction projects also have the potential to impact historic structures as a result of undertakings that result in loss or alteration of individual structures' historic fabric. These cumulative impacts are negligible to moderate, long- term and adverse. In conjunction with the impacts of other past, present and reasonably foreseeable future actions, implementation of the preferred alternative would contribute a benefit and thus reduce cumulative impacts on historic resources and preserve the integrity of the Corridor Area National Historic District.

Conclusions
No Action Alternative
Alternative A would have no effect on historic structures or the Historic District. The risk of damage or loss from fire would continue.

Preferred Alternative
Implementation of Alternative B would result in a moderate, long- term beneficial impact to the Cross Canyon Historic District by increasing protection from fire.

Section 106 Summary: After applying the Advisory Council on Historic Preservation's criteria of adverse effects (36 CFR Part 800.5, *Assessment of Adverse Effects*), the National Park Service concludes that implementation of the preferred alternative would result in a "no adverse effect" determination. The action meets conditions of the 1995 Servicewide Programmatic Agreement between NPS, the National Conference of State Historic Preservation Officers, and the Advisory Council on Historic Preservation for programmatic exclusion for the installation of fire suppression systems.

There would be no impairment of the park's historic structures as a result of either alternative.

VISITOR EXPERIENCE AND SAFETY

Affected Environment

The Corridor Area includes Bright Angel and North Kaibab trails, the most popular trails in the park. It includes visitor facilities at Indian Garden (camping), Phantom Ranch (camping, lodging,

visitor services) and Cottonwood Camp (camping). These sites are destinations or planned stopping points for visitors hiking or riding mules in the canyon. Potable water from the Transcanyon Pipeline is provided at each location. Occasionally the pipeline is shut down for repairs or maintenance and potable water is unavailable to the public at the above locations.

Visitor experience components that may be affected by this proposal are safety and visual quality. Natural sights and sounds prevail along the corridor trails during low visitor use periods.

Environmental Consequences

Methodology

Visitor surveys and personal observation of visitation patterns combined with assessment of what is available to visitors under current management were used to estimate the effects of the actions in the various alternatives. The impact on the ability of the visitor to experience a full range of park resources was analyzed by examining resources mentioned in the park's significance statement. The thresholds of change for the intensity of an impact are defined as follows:

Negligible: the impact is barely detectable, and/or will affect few visitors to the park.

Minor: the impact is slight but detectable, and/or will affect some visitors.

Moderate: the impact is readily apparent and/or will affect many visitors.

Major: the impact is severely adverse or exceptionally beneficial and/or will affect the majority of visitors.

Alternative A - No Action (Continue Current Management)
Implementing Alternative A would not adequately address the current and future needs of park visitor safety. This alternative would not address the lack of fire protection and would continue to place visitors using the structures at an unacceptable level of risk of potential injury or loss of life. OSHA regulations and fire codes would continue to be violated. No Action would cause the continuation of short- term, moderate adverse impacts to visitors. Short- term because visitors are not in the facilities for long periods of time and minor because the chance of a fire breaking out while a single party is in a facility is relatively low.

Other aspects of the visitor experience, such as encounter levels, recreation opportunities, and orientation, would not be affected by the proposal because the proposal is not changing any use levels, recreation opportunities, or means of orientation.

Most visitors may not recognize the lack of adequate fire detection and protection measures, but if a fire occurs in an occupied structure, there could be a moderate adverse effect on park visitors.

Alternative B – Preferred Alternative
Upgrading fire protection systems in visitor use facilities would affect visitor experience and safety as a long- term moderate beneficial impact. This alternative would provide more reliable potable water to visitors at Phantom Ranch and other locations within the Corridor Area. Efforts would be made to minimize the disruption to park visitors during the construction period but there could be impacts from equipment noise, some fugitive dust and the sight of open trenches or newly disturbed ground. The wilderness experience of visitors in some small

portions of proposed wilderness would be temporarily affected by noise from the helicopter used to ferry equipment and materials between the South Rim and Phantom Ranch or Indian Garden, However, this corridor receives the most park helicopter use and visitors may not be impacted as much as if it were encountered in other portions of the proposed wilderness. In addition, this would occur during the "off- peak" visitation season. These adverse impacts on visitor experience would be short- term, highly localized, and, therefore, minor in intensity. Following construction, there would be a long- term moderate beneficial impact to visitor experience and safety.

Other aspects of the visitor experience, such as encounter levels, recreation opportunities, and orientation, would not be affected by the proposal because it would not change any use levels, recreation opportunities, or means of orientation.

Cumulative Impacts

It is likely that beneficial cumulative impacts would result from this project, when combined with other projects planned over the next several years. Many projects planned in the park are to implement actions identified in the GMP and would result in positive impacts to visitor experience. Many of the projects planned or ongoing include building rehabilitation and construction of new facilities or improvements of old facilities for visitors (Greenway Trail, Mather Campground rehabilitation, Heritage Education Campus, consolidation of the backcountry and river permit facilities; all outside the corridor area). The incremental improvements in visitor facilities in the park are expected to have substantial benefits to visitor service in the park over the long- term. Combining these beneficial changes with the fire protection upgrade project is expected to improve the quality of visitor services in the park over the long- term. Therefore, moderate beneficial cumulative impacts are expected.

The EIS prepared for the GMP addresses some of these components. A cumulative impact assessment was conducted at that time, evaluating visitor experience as it relates to orientation and interpretation, visitor access and convenience, visitor services, and regional visitor experience. This EA incorporates by reference the cumulative impact analysis included in the 1995 Draft and Final EIS for the General Management Plan.

Conclusions

No Action Alternative

Implementing Alternative A would cause the continuation of short- term, moderate adverse impacts to visitors in the Corridor Trails area.

Preferred Alternative

Implementation of Alternative B would result in a long- term moderate benefits to visitor experience by providing safer visitor facilities. Short- term minor adverse impacts to the visitor experience may occur during construction.

PARK OPERATIONS

Affected Environment

The Corridor Area lies along Bright Angel and North Kaibab trails, the most heavily- used trails in the park. It includes developments for park operations (housing, mgmt. support) at Indian Garden, Phantom Ranch, Cottonwood Camp and Roaring Springs. Potable water from the Transcanyon Pipeline is provided at each location. Occasionally the pipeline is shut down for repairs or maintenance and potable water is unavailable at the above locations. The inner canyon location of these facilities makes them inaccessible to traditional structural fire fighting equipment.

Present fire alarms consist of only single station, local alarms and battery- powered smoke detectors in overnight use buildings. Existing water distribution systems are unable to support fire suppression efforts or any additional fire protection systems such as sprinklers or new hydrants. The few existing hose- house hydrants provide insufficient coverage and can provide only a fraction of the flow needed for fire suppression. Current pressure reducers at Phantom limit flow to standpipes and area due to pipe size reduction. The Final Engineering Report for the Corridor Area Fire Protection System (Arber 2002, available at the Denver Service Center) contains a detailed engineering description of existing conditions at each site.

Environmental Consequences

Definitions for levels of impacts to park operations efficiency are as follows:

Negligible: an action that could change the operations of the park, but the change would be so small that it would not be of any measurable or perceptible consequence.

Minor: an action that could change the operations of the park but the change would be slight and localized with few measurable consequences.

Moderate: an action that would result in readily apparent changes to park operations with measurable consequences.

Major: a severely adverse or exceptionally beneficial change in park operations.

Alternative A - No Action (Continue Current Management)
Implementing Alternative A would not address the lack of proven fire protection and would continue to place park visitors, park employees and concession employees at an unacceptable level of risk of potential injury, loss of life and loss of property. OSHA regulations and fire codes would continue to be violated. Park facilities, including several historic properties listed on the National Register, would remain at risk of damage or destruction from fire. Continuation of the current situation is expected to result in a long- term moderate adverse impact to park operations due to the inadequacy of existing fire protection at Corridor Area facilities.

Alternative B – Preferred Alternative
Selection of this alternative would benefit park operations by providing fire detection and suppression systems in remote park facilities and upgrading the existing water delivery network to support them. Installation of a by- pass would provide a continuous water supply to Phantom

Ranch during a shut- down of the Transcanyon Pipeline by backfeeding from a storage tank at Indian Garden. This alternative would provide more reliable potable water to employees at Phantom Ranch and other locations within the Corridor Area.

Efforts would be made to minimize the disruption to park employees during the construction period. Some park personnel time would be needed to work with the contractor before and during construction. Moderate, long- term benefits to park operations and historic structures would be achieved.

Helicopter ferry is deemed necessary due to weight of equipment and amount of materials. Although work sites are not in the proposed wilderness, noise from certain helicopter flight legs could impact wilderness values (natural sights and sounds) in small portions of the proposed wilderness. An alternative to conducting this project without helicopter use would be to use mules to pack in the equipment and materials. A Minimum Requirement Analysis (MRA) worksheet is attached to this EA as Appendix E.

Alternate Transport of Equipment and Materials

An alternative method of conducting the proposed project would be to pack in all equipment and materials with mules on existing trails. This method would preclude use of the excavator because it would not be possible to break it down in pieces small enough to be carried by mules. Digging over a mile of trenches with hand tools is not a feasible alternative due to time constraint imposed by sensitive wildlife species and employee safety considerations in the heat of summer. Another factor in this alternate method would be the amount and size of the pipe and other material needed. For example, the 6- inch PVC pipe comes in 20- foot lengths: too long and heavy for a mule to carry down the numerous switchbacks found on all the corridor trails.

Cumulative Impacts

Beneficial cumulative impacts to park operations would result from this project, when combined with other projects planned in the park over the next several years. Many projects would implement actions identified in the GMP and would result in positive impacts to park operations. Many of the projects being planned or ongoing include building rehabilitation (park headquarters, ranger operations, backcountry restrooms, etc.) and construction of new facilities or improvements of old facilities for park staff (NPS maintenance facility, emergency services facility). The beneficial impact of the proposed action would be a small component of the overall beneficial impact. Cumulatively, these incremental improvements in park staff and visitor facilities are expected to have substantial benefits to the park over the long- term. Upgrading fire protections systems would be another positive step toward improvement in overall park operations. Rehabilitation of older facilities for staff and visitor use in combination with construction of new facilities and renovation of others to best accommodate employee and park needs results in greater employee morale and more efficient park operations.

Some of these components are addressed in the EIS prepared for the GMP. A cumulative impact assessment was conducted at that time, evaluating park operations as they relate to housing, community services, management support facilities, and utilities. This EA incorporates by reference the cumulative impact analysis included in the 1995 Draft and Final EIS for the General Management Plan.

Conclusions

No Action Alternative

Alternative A would result in a continuation of moderate, long- term adverse impact to park operations due to the inadequacy of existing fire protection at Corridor Area facilities.

Preferred Alternative

Implementation of Alternative B would result in an overall moderate, long- term beneficial impact to park operations by providing greater protection for park facilities.

Chapter 4 – Consultation and Coordination

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Consultation

- The NPS contacted the Arizona Game and Fish Department (AGFD) to discuss state listed species of concern. The NPS will submit a copy of this EA to the AFGD.

- U.S. Fish and Wildlife Service (USFWS). The NPS contacted the USFWS to discuss listed endangered, threatened, and species of concern. The NPS has submitted a Biological Assessment

for the proposal to the USFWS and requested concurrence with the determination that the proposed action is not likely to adversely affect Mexican spotted owl or California condor.

Public Involvement

This proposal to upgrade the fire protection for the Corridor Area was included in a public scoping letter submitted to a 300- person Grand Canyon National Park mailing list in July 2002. The purpose of the scoping letter was to describe the proposed action to any interested/affected parties and solicit comments from those who may have issues with the proposed action. Three public responses to this scoping effort were received. Two were in favor of the project and one stated a position against it because of concerns that "the project expands the impacts related to development and urbanization into the park." A response from the Navajo Nation stated that they had no objections to the proposal. A letter from Xanterra, the Grand Canyon National Park Lodges concessionaire, stated that they are in favor of the proposal but had some engineering questions on the project. Their questions were answered in a letter from the NPS in August, 2002.

SELECTED REFERENCES

Executive Orders

Executive Order 11988 (Floodplain Management)

Executive Order 12898 (Environmental Justice)

NPS Director's Orders

DO- 2 Planning Process Guidelines

DO- 12 Conservation Planning, Environmental Impact Analysis and Decision Making

DO- 28 Cultural Resource Management Guideline

DO- 47 Sound Preservation and Noise Management

DO- 58 Structural Fire Management

DO- 65 Explosives Use and Blasting Safety

NPS- 77 Natural Resources Management Guideline

DO- 77- 1 Wetland Protection

US Federal Government and State Government

1963 Clean Air Act, as amended

1966 National Historic Preservation Act

1969 National Environmental Policy Act (NEPA)

1973 Endangered Species Act, as amended

1979 Archeological Resources Protection Act

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Fish and Wildlife Service. 1996b. Endangered and Threatened Wildlife and Plants; Establishment of a Nonessential Experimental Population of California Condors in Northern Arizona. Federal Register, October 16, 1996, Volume 61, Number 201, Page 54043- 54060.

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Navajo Nation. 2002. Letter dated October 3, 2002 from Robert Begay, Traditional Cultural Program. Window Rock, Arizona.

NFPA, 2001. NFPA Fire Prevention Code. National Fire Prevention Association. Quincy, Massachusetts.

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APPENDIX A

Grand Canyon General Management Plan (1995)
Excerpts Pertaining to Corridor Fire Protection Project

Management Objectives (Page 7 – 8)

The management objectives for Grand Canyon National Park, which are based on the park visions, set the direction for future park management. The objectives describe desired conditions to be achieved.

International Significance

- Manage the park to preserve its integrity as a world heritage site with natural and cultural resources of national and international significance.

Natural And Cultural Resources

- Preserve, protect, and interpret the park's natural and scenic resources and values, and its ecological processes.
- Preserve, manage, and interpret park cultural resources (archeological, ethnographic, architectural, and historic resources, trails, and cultural landscapes) for the benefit of present and future generations.
- Preserve, protect, and improve air quality and related values such as visibility.
- Manage visitor use, development, and support services to protect the park's resources and values.
- Preserve and protect the genetic integrity and species composition within the park, consistent with natural ecosystem processes.
- To the maximum extent possible, restore altered ecosystems to their natural conditions. In managing naturalized ecosystems, ensure the preservation of native components through the active management of nonnative components and processes.
- Manage ecosystems to preserve critical processes and linkages that ensure the preservation of rare, endemic, and specially protected (threatened/endangered) plant and animal species.
- Protect the natural quiet and solitude of the park, and mitigate or eliminate the effects of activities causing excessive or unnecessary noise in, over, or adjacent to the park.
- Preserve natural spring and stream flows and water quality. Withdraw only the minimum water necessary to meet park purposes. To the maximum extent feasible, strive to meet increases in water demand by conserving and reusing water.
- Provide opportunities for scientific study and research focused on the Grand Canyon, consistent with resource protection and park purposes.
- Inventory, monitor, and maintain data on park natural and cultural resources and values, and utilize this information in the most effective ways possible to facilitate park management decisions to better preserve the park.

- Identify and evaluate all cultural properties within the park for inclusion on the National Register of Historic Places.

Visitor Experience

- Provide a diverse range of quality visitor experiences, as appropriate, based on the resources and values of the Grand Canyon, compatible with the protection of those resources and values.
- Provide access that is appropriate and consistent with the character and nature of each landscape unit and the desired visitor experience.
- Consistent with park purposes and the characteristics of each landscape unit, preserve and protect the maximum opportunities in every landscape unit of the park for visitors to experience the solitude, natural conditions, primitiveness, remoteness, and inspirational value of the Grand Canyon.
- Provide equal access to programs, activities, experiences, and recreational opportunities for individuals with disabilities, as appropriate and consistent with the levels of development and inherent levels of access in areas within the park.
- Provide a safe, efficient, and environmentally sensitive transportation system for visitors, employees, and residents, consistent with management zoning and resource considerations. Emphasize non- motorized modes of transportation wherever feasible.
- Develop visitor use management strategies to enhance the visitor experience while minimizing crowding, conflicts, and resource impacts.
- Provide visitor and employee facilities and services, as necessary and appropriate, in or adjacent to areas dedicated to those uses or in appropriate disturbed areas.

Facility Design

- Consistent with its purpose, strive to make Grand Canyon National Park a model of excellence in sustainable design and management through such means as energy efficiency, conservation, compatibility with historic setting and architecture, recycling, accessibility, and the use of alternative energy sources.
- Encourage appropriate use and adaptive reuse of historic structures, while preserving historic integrity.
- Ensure that development and facilities within the park are necessary for park purposes.
- Ensure that park developments and operations do not adversely affect park resources and environments, except where absolutely necessary to provide reasonable visitor access and experiences.

APPENDIX B

Compliance

The following laws and associated regulations provided direction for the design of project alternatives, the analysis of impacts, and the formulation of mitigation/avoidance measures:

National Environmental Policy Act of 1969 (NEPA) (Title 42 U.S. Code Sections 4321 to 4370 [42 USC 4321-4370]). The purposes of NEPA include encouraging "harmony between [humans] and their environment and promote efforts which will prevent or eliminate damage to the environment. . .and stimulate the health and welfare of [humanity]". The purposes of NEPA are accomplished by evaluating the effects of federal actions. The results of these evaluations are presented to the public, federal agencies, and public officials in document format (e.g., environmental assessments and environmental impact statements) for consideration prior to taking official action or making official decisions. Implementing regulations for the NEPA are contained in Part 1500 to 1515 of Title 40 of the U.S. Code of Federal Regulations (40 CFR 1500- 1515).

Clean Water Act of 1972, as amended (CWA) (33 USC 1251- 1387). The purposes of the CWA are to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters". To enact this goal, the U.S. Army Corps of Engineers (Corps) has been charged with evaluating federal actions that result in potential degradation of waters of the U.S. and issuing permits for actions consistent with the CWA. The U.S. Environmental Protection Agency also has responsibility for oversight and review of permits and actions, which affect waters of the U.S. Implementing regulations describing the Corps' CWA program are contained in 33 CFR 320- 330.

Clean Air Act (PL chapter 360, 69 Stat 322, 42 USC 7401 et seq.). The main purpose of this act is to protect and enhance the nation's air quality to promote the public health and welfare. The act establishes specific programs that provide special protection for air resources and air quality related values associated with NPS units. The U.S. Environmental Protection Agency has been charged with implementing this Act.

Endangered Species Act of 1973, as amended (ESA) (16 USC 1531- 1544). The purposes of the ESA include providing "a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved". According to the ESA, "all Federal departments and agencies shall seek to conserve endangered species and threatened species" and "[e]ach Federal agency shall. . .insure that any action authorized, funded, or carried out by such agency. . .is not likely to jeopardize the continued existence of any endangered species or threatened species". The U.S. Fish and Wildlife Service (non- marine species) and the National Marine Fisheries Service (marine species, including anadromous fish and marine mammals) administer the ESA. The effects of any agency action that may affect endangered, threatened, or proposed species must be evaluated in consultation with either the USFWS or NMFS, as appropriate. Implementing regulations which describe procedures for interagency cooperation to determine the effects of actions on endangered, threatened, or proposed species are contained in 50 CFR 402.

National Historic Preservation Act of 1966, as amended (NHPA) (16 USC 470 *et sequentia*). Congressional policy set forth in the NHPA includes preserving "the historical and cultural foundations of the Nation" and preserving irreplaceable examples important to our national heritage to maintain "cultural, educational, aesthetic, inspirational, economic, and energy benefits". The NHPA also established the National Register of Historic Places composed of "districts, sites, buildings, structures, and objects significant in American history, architecture, archeology, engineering, and culture". The NHPA requires that federal agencies take into account the effects of their actions on properties eligible for or included in the National Register of Historic Places and coordinate such actions with State Historic Preservation Offices (SHPO). NHPA also requires federal agencies, in consultation with the SHPO, to locate, inventory, and nominate all properties that appear to qualify for the National Register of Historic Places, including National Historic Landmarks. Further, it requires federal agencies to document those properties in the case of an adverse effect and propose alternatives to those actions, in accordance with the NEPA.

APPENDIX C

DEVELOPMENT OF ALTERNATIVES

During the spring and summer of 2000, an NPS facility- programming group met to develop a Corridor Area fire protection system upgrade. Several alternative schemes were developed for upgrading the fire protection at the sites. A Choosing by Advantages (CBA) exercise was held on October 11- 12, 2000 to weight the merits of various alternatives against the cost. The scope of the CBA included the evaluation of several alternative locations for a water storage tank at Phantom Ranch. Five specific alternatives were evaluated during the CBA exercise and one alternative, alternative 2 – direct connection, was selected as the preferred alternative for three of the four areas using cost/benefit ratios, specifically Roaring Springs, Cottonwood Camp, and Indian Garden. Alternative 1 Self- contained fire sprinkler system, appeared to be the preferred option for Phantom Ranch; however, post CBA review developed a variation of alternative 2 – Direct connection with a sand trap bypass at Indian Garden. This eliminated the need for a storage tank at Phantom Ranch and addressed concerns for water supply during outages caused by failure of the transcanyon pipeline.

These alternatives are described in more detail in the next section, with the rationale for their subsequent elimination from further detailed analysis.

This proposed action was brought forward into public scoping and a scoping letter was released in June 2002. From public scoping activities, three comments were received. The Park Service performed a content analysis on this information, information gained from internal scoping, and information gained from scoping with other agencies. From this effort, the Park Service did not identify any additional significant issues for analysis.

ALTERNATIVES ELIMINATED FROM DETAILED ANALYSIS

Alternative 1 – Self- Contained Fire Sprinkler System
Alternative 1 represents a minimal approach to fire protection with independence from the Transcanyon Pipeline. A self- contained pressure tank of 300 gallon capacity is pressurized by a nitrogen cylinder to supply the building sprinkler system. This system is totally independent of the potable supply and is designed to provide a sprinkler flow of 0.10 gpm/ft^2 over a 300 ft^2 area (30 gpm – two heads at 15 gpm each covering 150 ft^2) for 10 minutes. The existing potable supply and distribution system remains unchanged.

Alternative 3 – Storage Tank with Gravity Flow Fire Sprinkler System and Distribution System Improvements
Alternative 3 is the same as Alternative 2 outlined above, except it includes a storage reservoir sized to supply water throughout a typical five- day outage of the Transcanyon Pipeline. During normal operation, the reservoir is kept full by the Transcanyon Pipeline. Water distribution and fire protection is independent of electrical power. This alternative provides the highest level of fire protection and also provides for domestic water demand during a Transcanyon Pipeline outage. Tank construction will be very difficult and costly and visual intrusion would be the greatest of all alternatives.

Alternative 4 – Storage Tank with Booster Pumps for Fire Sprinkler System and Distribution System Improvements

Alternative 4 is the same as Alternative 3 above except the storage tank would be located at a lower elevation necessitating boosting domestic and fire flows. Tank construction will be simplified and less costly, and visual intrusion is less significant, than Alternative 3.

Alternative 5 – Non- Potable Water Supply Draft from Creek

Alternative 5 allows the existing potable water system to remain in place but provides a new non-potable water distribution system for fire protection. When signaled by a low- pressure switch, raw water from Bright Angel Creek is pumped into the system and supplies building sprinklers and hose hydrants at the rates indicated for Alternative 2 above.

The value study team examined nine alternatives and proposals for improving the fire protection system. The seven alternatives shown as shaded below were examined further and considered for implementation.

Table 4. Fire Protection Alternatives

FIRE PROTECTION Alternative (Brainstormed)	Pros	Cons
Self- Contained (A,B,C,D)	• 95% effective all the time	• No infrastructure improvements
Direct Connection (A,B,C,D)	• Infrastructure improvements • 98% effective when pipeline in service	• Seven times out per year except Indian Garden 25 days/year
Direct Connection fed from a Gravity Tank (C)	• 98% effective all the time • Potable supply too	• To provide adequate pressure, the tank would need to be located approximately 175′ above the service area
Direct Connection fed by a pump station and a below grade tank (C)	• Some infrastructure improvements • Provides potable storage	• Subject to power failure • Mechanical system requiring maintenance
Fire Draft System from Bright Angel Creek (C)	• All new fire water distribution system	• Subject to power failure • 98% reliable
No Action (A,B,C,D)	• No impacts due to construction	• No improvements to life and safety risk
Develop Fire Protection Plan at Phantom Ranch and Indian Garden	• No discussions were made	• Lack of trained staff to implement plan
Non- Water Systems: Foam, Dry Chemical, CO_2	• Not reliant on water system	• Costly • Potentially hazardous to humans.
Fed by Direct Connection pump stations and a series of small below grade tanks (C)	• Provides potable storage • Low impact to resources	• Mechanical systems that must be maintained

(A) – This alternative is considered for implementation at Roaring Springs.
(B) – This alternative is considered for implementation at Cottonwood Camp.
(C) – This alternative is considered for implementation at Phantom Ranch.
(D) – This alternative is considered for implementation at Indian Garden.

The proposal identified as Alternative 2 in the CBA (Arber 2001) includes direct connection to the transcanyon pipeline and associated work, and has been selected as the alternative to carry forward into detailed analysis. This alternative is identified as Alternative B – Preferred Alternative in this Environmental Assessment and is described fully in Chapter 2.

APPENDIX D

Listed Species Descriptions

Niobrara Ambersnail - Not Currently Listed - A small population of Niobrara ambersnail (Succineidae: *Oxyloma haydeni haydeni*) is found at Indian Garden, Grand Canyon National Park's most heavily visited inner canyon site. This landsnail population exists in a small amount of primary habitat (0.07 ha) composed of bulrush (*Schoenoplectus (Scirpus) americanus*) and cattails (*Typha domingensis*) along a spring system in upper Garden Creek. This is one of only two natural populations of this species known in Arizona; the other population exists at a spring at the Colorado River upstream from Lees Ferry. The Indian Garden population is one of only three natural populations of the genus *Oxyloma* known in Arizona. This population is genetically distinct, but is the most closely related taxon to the endangered Kanab ambersnail (*O.h. kanabensis*; Miller et al. 2000); however, the snail population is not presently protected as a federally listed endangered species.

Threats

The landsnail habitat surveyed here has been substantially affected by NPS management activities, including: maintenance of several trails, a presently abandoned day- use picnic area, water pipelines for three drinking fountains, two search and rescue cabins, stream channel modification and occasional "weed- whacking" of the lower portion of the habitat patch. A greater threat lies in the expansion of non- native vegetation, particularly non-native grasses and Himalaya berry, which should be prevented from expanding into these patches of primary habitat (Stevens 2001).

The NPS is considering trenching in the vicinity of the snail habitat to place water pipes. The NPS may elect to evaluate the proposed trenching so as to minimize impact on the snail habitat. To achieve this, I recommend that the trenching activity remain at least 3 m (10 feet) from the edge of primary habitat patches, and care be taken to assure that the trenching does not affect spring discharge. Trenching during the rainy season should also be avoided, so as not to increase runoff and erosion on these habitat patches. These recommendations are reasonably simple, and should not interfere with the NPS's plans while still protecting this remarkably small ambersnail habitat (Stevens 2001).

Despite the small amount of primary habitat (0.07 ha), the Niobrara ambersnail population has demonstrated great resilience over the past five years, and shows no apparent sign of a recent genetic "bottleneck" (Miller et al. 2000).

Data Sources

Miller, M.P., L.E. Stevens, J.D. Busch, J.A. Sorensen, and P. Keim. 2000. Amplified fragment length polymorphism and mitochondrial sequence data detect genetic differentiation and relationships in endangered southwestern U.S.A. ambersnails (*Oxyloma* spp.). Canadian Journal of Zoology 78:1845- 1854.

Stevens, Lawrence E. 2001. Niobrara Ambersnail (*Oxyloma H. Haydeni*) Habitat At Indian Garden, Grand Canyon National Park: Final Report. Report prepared for Grand Canyon National Park, Arizona.

Mexican Spotted Owl – Threatened - Mexican spotted owls nest and roost primarily in closed- canopy forests or rocky canyons. Forests used for roosting and nesting often contain mature or old growth stands with complex structure. These forests are typically uneven- aged, multistoried, and have high canopy closure. Mexican spotted owls do not build nests, but use naturally occurring sites, often in large diameter trees, cliff cavities and abandoned hawk or raven nests. Spotted owl prey mainly on small mammals, particularly arboreal or semi arboreal species, although birds, insects, reptiles and other types of small mammals are taken as well. Prey species composition varies with cover type. Spotted owls occur in canyon habitat of Grand Canyon National Park (GRCA).

Local Population. Mexican spotted owls occur in Arizona, New Mexico, southern Utah, and portions of Colorado and in Mexico. Mexican spotted owls are typically associated with late seral forests and generally found in habitat that includes mixed conifer and pine- oak forests, riparian madrean woodland, and sandstone canyonlands (U.S. Fish and Wildlife Service 1995). However, Mexican spotted owls have been found in relatively open shrub and woodland vegetation communities in arid canyonland habitat (Willey 1995), contrary to the typical mature forest habitat believed to be the classical norm. Several territories have been identified in GRCA, although no Protected Activity Centers (PACs) have yet been designated. MSO's were listed as a threatened species in March 1993 and parts of Grand Canyon National Park were designated as critical habitat in February 2001. A Recovery Plan was published in December 1995. Six Recovery Units were identified in the Plan to allow for specific recovery strategies for each area. GRCA is located with the Colorado Plateau Recovery Unit.

The presence of Mexican spotted owls within Grand Canyon National Park was confirmed in 1992 through field surveys of approximately 6,000 acres of suitable habitat on the North and South Rims. Additional Mexican spotted owl surveys occurred in 1994 and 1995 along the South Rim and in 1998 and 1999 along the North Rim, including the project area. These surveys had negative results. In 1999, additional surveys were conducted in side canyon habitat along the Colorado River corridor and responses were received at six locations. Surveys for Mexican spotted owls near the project area were re- initiated in 2001 and are currently ongoing.

The size and extent of the Mexican spotted owl population at Grand Canyon is currently unknown. However, surveys and location of discoveries suggest that Mexican spotted owls occupy the rugged canyonland terrain within the Grand Canyon. Mexican spotted owl habitat exists below the north and south rims, and in side canyons of the inner canyon. Continued surveys will be necessary to determine the full extent of their range in Grand Canyon.

Threats. The primary threats cited for the owl in most Recovery Units include large- scale catastrophic wildfire and timber harvest. Potential threats cited specifically for the Colorado Plateau Recovery Unit focus more on recreational impacts, road building, and overgrazing.

Data Sources

Willey, D. W. 1995. "Mexican Spotted Owls in Canyonlands of the Colorado Plateau." In *Our Living resources: A report to the Nation on the Distribution, Abundance, and Health of U.S. Plants, Animals, and Ecosystems*, edited by E.T. LaRoe, G.S. Farris, C.E. Puckett, P.D. Doran, and M.J. Mac. U.S. Department of the Interior, National Biological Service, Washington, D.C.

California Condor – Threatened – Condors are large birds that reach sexual maturity by 5- 6 years of age. They are strict scavengers and rely on finding their food visually, often by investigating the activity of ravens, coyotes, eagles, and other scavengers. Without the guidance of their parents, young inexperienced juveniles may also investigate human activity. As young condors learn and mature, this human- directed curiosity diminishes. Nesting habitat for California condors includes various types of rock formations such as crevices, overhung ledges, small caves, and potholes. Most California condor foraging occurs in open terrain. Typical foraging behavior includes long- distance reconnaissance flights, lengthy circling flights over a carcass and hours of waiting at a roost or on the ground near a carcass. Roost sites include cliffs and tall trees, including dead trees (U. S. Fish and Wildlife Service 1996).

Local Population. The California condor was listed as an endangered species in March 1967 and remains classified as endangered today. In 1996, the U.S. Fish and Wildlife Service established a nonessential, experimental population of California condors in Northern Arizona. In December 1996, the first condors were released in the Vermilion Cliffs area of Coconino County, Arizona, approximately 48 kilometers (30 miles) north of Grand Canyon National Park. Subsequent releases have occurred in May 1997, November 1997, November 1998, and December 1999 in the same vicinity and Hurricane Cliff area, which is about 60 miles west of Vermilion Cliffs. By declaring the population "experimental, nonessential", the U.S. Fish and Wildlife Service can treat this population as "threatened" and develop regulations for management of the population that are less restrictive than mandatory prohibitions covering endangered species. This facilitates efforts to return the condor to the wild by providing increased opportunities to minimize conflict between the management of the condors with other activities. Within Grand Canyon National Park, the condor has the full protection of a threatened species (NPS Management Policies).

All of the condors in the experimental, nonessential population in Northern Arizona are fitted with radios allowing field biologists to monitor their movements. During 1999, the condors were observed as far west as the Virgin Mountains near Mesquite, Nevada; south to the San Francisco peaks outside of Flagstaff, Arizona; north to Zion and Bryce Canyon National Parks and beyond to Minersville, Utah; and east to Mesa Verde, Colorado and the Four Corners region (Peregrine Fund 2000). Monitoring data indicate condors are using habitat throughout Grand Canyon National Park, with concentration areas in Marble Canyon, Desert View to the Village on the South Rim, the Village to Hermits Rest, and Bright Angel Point on the North Rim.

Threats. A main reason for the decline of condors was an unsustainable mortality rate of free- flying birds combined with a naturally low reproductive rate. Most deaths in recent years have been related to human activity. Shootings, poisonings, lead poisoning, and powerline collisions are considered the condor's major threats.

Data Sources
Peregrine Fund. 2002. Information extracted from "Notes from the Field". Available on Internet at http://www.peregrinefund.org/notes_condor.html

Bald Eagle - Threatened - The bald eagle ranges over most of the north American continent, from as far north as Alaska and Canada, down to northern Mexico. Its diet is largely made up of fish, especially salmon; also small mammals, waterfowl, seabirds, and carrion. It is usually found near bodies of water such as coasts, rivers and large lakes. Some birds are nesting residents while a larger number winters along rivers and reservoirs. An estimated 200 to 300 birds winter in Arizona (USFWS). In the 17 years since it was listed throughout the conterminous 48 States, the bald eagle population has clearly increased in number and expanded in range. The improvement is a direct result of the banning of DDT and other persistent organochlorines, habitat protection, and from other recovery efforts. This species has been proposed for de- listing but still receives full protection under the ESA..

Threats
In addition to threats in common with other recovery regions, such as human disturbance and availability of adequate nesting and feeding habitat, the bald eagles of the Southwestern Recovery Region, and nestlings in particular, are subjected to heat stress, nest parasites, and entanglement in fishing line debris from intense fishing pressure (USFWS).

Data Sources.
USFWS, Endangered and Threatened Species; Bald Eagle Reclassification; Final Rule. *Federal Register*, Vol. 60, No. 133, pp. 36000- 36010.

Humpback Chub - Endangered - This species is found in the Colorado River between Nevada and Arizona, the Moapa and Virgin Rivers and the Pahranagat Valley. The chub's preferred habitat is large, warm turbid rivers especially canyon areas with deep fast water. There is critical habitat for this species in the Grand Canyon. A Recovery Program agreement, signed in January 1988, outlines steps to aid in the recovery of this species and the razorback sucker.

Threats
Endangered due to destruction and modification of habitat through impoundment (e.g., stream inundation, reduced water temperatures, and reduced spring flows resulting from construction of Hoover Dam, Glen Canyon Dam, and Flaming Gorge Dam); introduced competitors and predators; hybridization with G. ELEGANS and G. ROBUSTA. Flow reductions and low water temperatures may curtail successful spawning and increase competition with other species.

Razorback Sucker - Endangered - This species prefers riverine and lacustrine areas, generally not in fast moving water and may use backwaters. Found in Colorado and Gila River basins. Critical habitat includes the 100- year floodplain of the Colorado River through the Grand Canyon from the confluence with Paria River to Hoover Dam.

Threats Decline of the razorback sucker is primarily caused by changes in stream flow and water temperatures, direct loss of habitat due to inundation by reservoirs, blockage of migration routes and the introduction of non- native fish species.

Data Sources.

USFWS, 2002. County Species List - Coconino County. Arizona Ecological Services Office. Phoenix, Arizona.

APPENDIX E

Minimum Requirement Analysis

PROPOSED ACTION: Transport of equipment and materials needed to upgrade fire protection systems at Phantom Ranch and Indian Garden (refer to Environmental Assessment - Upgrade Corridor Area Fire Protection).

Lead(s): Jim Pennington and Dan Cloud, DSC

PART A: MINIMUM REQUIREMENT: Is this action necessary to manage the area as wilderness?

1. **IS THIS AN EMERGENCY?**
   YES: Act according to approved emergency minimum tool criteria.

   → NO: **XX**

   Equipment ferry needed to perform project work due to weight of motorized equipment and size/amount of materials.

2. **IS THE PROPOSED ACTION ALLOWED BY LEGISLATION, POLICY, OR AN APPROVED MANAGEMENT PLAN?**
   → YES: Do according to approved criteria.

   NO:

   Protecting historic resources is a GRCA GMP goal and upgrading the corridor fire suppression system is mentioned in the EIS prepared for the GMP. Helicopter use will adhere to criteria and guidelines in approved plans (description of Preferred Alternative on pages 14-18 of Environmental Assessment (EA)).

3. **CAN THE OBJECTIVES BE ACCOMPLISHED THROUGH AN ACTION OUTSIDE OF WILDERNESS?**
   → YES: Phantom Ranch and Indian Garden are not in proposed wilderness.

   NO: **XX**

   Helicopter ferry is necessary due to weight of equipment and size/amount of materials. Although work sites are not in proposed wilderness, noise from portions of helicopter flights could impact wilderness values such as natural sights and sounds.

4. **DOES THIS ACTION CONFLICT WITH LONG- TERM WILDERNESS PLANNING GOALS, OBJECTIVES OR DESIRED FUTURE RESOURCE CONDITIONS?**
   YES: Do not do action.

   → NO: **XX**

Proposal would not affect wilderness planning goals or long- term desired resource conditions. Would not diminish suitability for future designation of any portion of proposed wilderness. May cause temporary, indirect impacts to experience of any visitors in portions of proposed wilderness near flight paths. Mitigation would reduce potential impacts (EA mitigating measures 16, 17, and 18).

5. **CAN THE OBJECTIVES BE ACCOMPLISHED THROUGH AN ACTION THAT DOES NOT INVOLVE PROHIBITED USES?**
   → YES, Use of helicopter and motorized equipment at Phantom Ranch and Indian Garden not prohibited by law or NPS Management Policies.

   NO: **- DO PART B**

PART B: Determining the MINIMUM TOOL (*HOW the action should be done)*

6. **DESCRIBE IN DETAIL, ALTERNATE WAYS TO ACCOMPLISH THE PROPOSED ACTION.** (The may include primitive skills/tool, mechanized/motorized, and/or combination of alternatives.)

ALTERNATE METHOD 1:

Proposal: Upgrade fire protection systems in structures at Indian Garden, Phantom Ranch, Cottonwood Camp, and Roaring Springs (full project description in Environmental Assessment, pages 14- 18).

Manner: Use helicopter to haul materials and ferry equipment needed to upgrade fire protection systems at Phantom Ranch and Indian Garden.

Proponent: The project is supported by park management and is the Preferred Alternative in the Environmental Assessment (see EA for full analysis).

When: If the Preferred Alternative is selected, construction would begin no earlier than October 15, 2003 and the one- time project would be completed by April 15, 2004. Work would be done at one location at a time.

Place: Helicopter use would be needed at Phantom Ranch and Indian Garden. Work at Cottonwood Camp and Roaring Spring would be completed with hand- operated equipment and materials packed in with stock animals.

Equipment needed for this project would include a small excavator (*Bobcat*- size), a gasoline-powered trencher, gas- powered tamper, and gas- powered rock drill. The excavator and trencher would not be needed at Cottonwood Camp or Roaring Spring. Helicopter would be used to transport equipment and material only (no construction- related work or personnel transport).

Workers would walk or ride mules to and from the work sites.

Anticipated Impacts

See Affected Environment and Environmental Consequences section of EA for full environmental impact analyses (starting on EA page 21). The project does not take place in and would not directly affect proposed wilderness. Noise from portions of helicopter flights could affect wilderness values such as natural sights and sounds in small portions of proposed wilderness. The proposal would not affect wilderness planning goals or long- term desired resource conditions. It would not diminish wilderness suitability of any portion of proposed wilderness. Mitigation would reduce potential impacts (EA mitigating measures 16, 17, and 18).

ALTERNATE METHOD 2:

An alternative method of conducting the proposed project would be to pack in all equipment and materials with mules on existing trails from the South Rim to Indian Garden and Phantom Ranch. This method would preclude use of the excavator because it would not be possible to break it down in pieces small enough to be carried by mules. Digging over a mile of trenches with hand tools would conflict with time constraint imposed by sensitive wildlife species and employee safety considerations during periods of extreme heat. Another factor in this alternate method would be the amount and size of the pipe and other material needed. For example, the 6- inch PVC pipe comes in 20- foot lengths: too long and heavy for a mule to carry down the numerous switchbacks found on all the corridor trails.

Since neither motorized equipment or mechanized transport would be used within or over proposed wilderness in this method, it will not be analyzed further.

7. EVALUATE WHICH ALTERNATIVE WOULD HAVE THE LEAST IMPACT ON WILDERNESS RESOURCES, CHARACTER AND VISITOR EXPERIENCE WHILE ACHIEVING THE OBJECTIVES.

Alternate Method 2 (no mechanized transport) would have the least direct and indirect impact on wilderness resources and values because no helicopter overflights would occur. However, this alternate is not feasible because the lengths of large pipe would be impossible for mules to transport to the work sites.

Alternate Method 1 (helicopter ferry to two sites) would not directly affect wilderness resources or physical character because no landings or work would be done in proposed wilderness. Visitor's wilderness experience would receive temporary adverse impacts from the noise and sight of the helicopter flying overhead. This would only occur in small areas of proposed wilderness and during the "off- peak" visitation season, so few visitors would be affected.

8. SELECT AN APPROPRIATE PREFERRED ALTERNATIVE.

Based on the above analysis and analysis done in the Environmental Assessment, the Preferred Alternative for the purposes of this Minimum Requirement Analysis is the same as for the Environmental Assessment - - Alternative B using Alternate Method 1. Alternate Method 2 was

determined to be infeasible due to inability of mules to transport the equipment and materials needed to meet the project's need and objectives.

Project Proposal

This alternative would add fire protection systems at Indian Garden, Phantom Ranch, Cottonwood Camp and Roaring Springs, thus greatly diminishing the risk of loss from structural fires. For a full description of the project, see the Environmental Assessment, pages 14- 18.

Equipment and materials would need to be flown by helicopter in and out of Indian Garden and Phantom Ranch due to the size and weight of motorized equipment and the amount of materials. In addition to the equipment listed above there would be construction material such as PVC piping, joints, valves, hydrants, and hand tools. Equipment would most probably be flown to Phantom Ranch first, then ferried to Indian Garden, and then out of the canyon. An estimate of trips required to move equipment and materials to each site is shown in the following scenario:

MISSIONS/FLIGHTS	**NUMBER**
1. South Rim to Phantom Ranch	4 round- trips
2. Phantom Ranch to Indian Garden	3- 4 round- trips
3. South Rim to Indian Garden (may not be necessary)	1 trip
4. Indian Garden to South Rim	3 round- trips

None of the project sites are in proposed wilderness. Noise from the helicopter would affect Phantom Ranch and Indian Garden, and areas of proposed wilderness between these sites and the South Rim.

Helicopter use would adhere to the following contract specifications:

1- 1 INNER CANYON HELICOPTER REGULATIONS:

A. HELICOPTER AVAILABILITY: The work of this contract will require delivery of construction materials and equipment to sites in the inner canyon of Grand Canyon National Park that cannot be accessed by conventional land- travel vehicles. Contractor- leased or privately owned and operated aircraft is not authorized. On a strictly administered basis, the National Park Service will provide all helicopter services for this contract in strict accordance with the schedule, flight hours and load weights negotiated with the Contractor. All Government furnished aircraft shall have hook/load insurance protecting all loads from pickup to delivery, and shall have all required rigging and riggers. Helicopter services are not available as a transportation convenience. Use of a helicopter for transportation of Contractor personnel shall not be allowed except at noted in paragraph 1- 3.

B. ADVANCE FLIGHT APPROVAL: All scheduled flights shall be approved in advance by the Park Superintendent, and will be provided by the National Park Service (NPS) at the Government's expense. If additional flights become necessary as a result of contractor negligence or poor planning, cost incurred by the Government for such flight time will be

charged to the contractor. If additional flights become necessary as a result of the Government changing or modifying conditions, flight time will be at the Government's expense.

C. DELAY IN HELICOPTER AVAILABILITY: Weather, national emergencies, local emergencies, or medical emergencies to Park visitors or employees, as determined by the NPS Helibase Manager on duty, could delay the availability of a contractor scheduled government-provided helicopter. The unavailability of a scheduled helicopter will be considered a delay only when it prevents the contractor from performing time- sensitive movement of needed equipment into the Canyon, between work sites, or out of the Canyon. Unavailability of a helicopter scheduled for personnel or materials movement will not be considered a delay.

D. POLICIES AND REGULATIONS: Contractor use of government- provided helicopters will require close coordination with the Contracting Officer and stringent adherence to National Park Service policy and applicable safety regulations. If transportation of Contractor's personnel is approved by the Government as allowed in paragraph 1- 3, the Contractor's personnel will be briefed on flight safety regulations and personal protective equipment by NPS prior to each flight. Contractor personnel shall follow all procedures as directed by NPS flight operations crew.

1- 2 MATERIAL AND EQUIPMENT DELIVERY FLIGHTS:

A. AIRCRAFT: The NPS helicopter can haul a sling- load of 1500 pounds under favorable weather conditions. Heavy- lift helicopters, of capacity up to 17,000 pounds, will be made available by the Government. The need for and frequency of using heavy- lift aircraft must be identified during contract negotiations. The Park Superintendent, Helibase Manager and the Contracting Officer will evaluate the Contractors request and jointly determine if heavy- lift aircraft is justified. If authorized, the NPS Helibase Manager will make the necessary arrangements to obtain the required aircraft.

B. SCHEDULING: Prior to negotiations the Contractor shall prepare an overall flight schedule clearly itemizing and identifying lift capacity needs to be met by Government aircraft. The Contractor shall submit a final list of materials and equipment, their weights, and an overall flight schedule, a minimum of seven working days prior to the desired flight date for the Park helicopter and a minimum of 45 days in advance of desired flight dates of heavy- lift aircraft. The Park Superintendent, Helibase Manager and Contracting Officer shall review, modify if necessary, and approve the flight schedule.

C. STAGING: All materials and equipment scheduled for delivery to the inner canyon will be delivered to a designated staging area at the South Rim helibase by no later than *one week prior to flight time*. The Contractor must provide at the time of negotiations and again at the time of delivery to the staging area, a certified list of the weights of all material, equipment and equipment parts to be transported. Equipment weights shall be based on the smallest component or lightest load available. The Contractor shall also provide, at the time of delivery to the staging area, the replacement value of all equipment to be transported. If Government furnished materials are being used in the project, the Contractor must plan and coordinate with the Contracting Officer to arrange delivery of the items to the helibase.

D. ESSENTIALS ONLY: Only essential materials and equipment required to complete the work of this contract will be transported to the work sites by helicopter. Essentially all materials and equipment will be transported in sling- loads suspended under the aircraft. Small items not conducive to transporting in a sling will be carried inside the aircraft. For items measured in lineal feet the Contractor will be allowed to transport no more than 105 percent of the

estimated quantity to the work sites as indicated in the final engineers cost estimate. Equipment will be limited to the smallest and lightest equipment that will do the job.

E. LOAD PLANNING: Prior to negotiations, all materials and equipment must be broken down into loads within the weight limits of available aircraft as indicated in Article 1.2.A. above. The Contractor shall plan and arrange all materials into loads of approximately equal weights not to exceed these limits unless directed otherwise by the NPS flight operations personnel. After coordination with the Contractor, NPS personnel will rig the sling loads for each flight. During storage at the staging area and during flights to the job sites, the government is responsible for all loads

F. MOVING EQUIPMENT AND MATERIALS BETWEEN WORK SITES: Equipment shall not be removed from a work site until its use is completed. Equipment shall be moved by helicopter from one work site to another only once and hauled into and out of the inner canyon only once. Materials shall not be moved between work sites by helicopter during execution of the contract. After delivery of equipment and materials to staging area and separation into individual loads, Contractor personnel must remain clear of entire aviation air operation both at pick up and drop off locations. Government will be responsible for security of equipment and materials from staging area to delivery site.

1- 3 PERSONNEL TRANSPORT BY HELICOPTER:

A. EMERGENCIES: With the exception of emergency situations, flights to transport Contractor personnel to and from the work sites will not be authorized. Contractor personnel will be required to hike to and from the work sites via well established, but strenuous routes on the Bright Angel or South Kaibab trails.

B. NON EMERGENCY: In general Contractor personnel requiring non- emergency access to the work site(s) will be required to receive basic aviation safety training prior to their flight. Such training and flights must be scheduled at least three weeks in advance. In very limited circumstances, unscheduled, non- emergency helicopter transport of Contractor personnel may be authorized by the Contracting Officer and the Park Superintendent if they determine such travel to be in the best interest of the Government. If such travel is approved, Contractor personnel may be asked to sign a form (Release Form OAS- 115) which will release the government from any and all responsibility for accidental death or injury resulting from such travel. Contractor personnel will be required to wear government supplied personal protective equipment consisting of a flight suit, leather gloves, and a flight helmet. Leather boots are required and are not supplied by the Government. All Contractor personnel must provide their own all leather boots. The number of flights will be strictly limited to only flights necessary to complete the project. Absolutely no Contractor personnel will be permitted on a sling load flight.